The FOUNDRY

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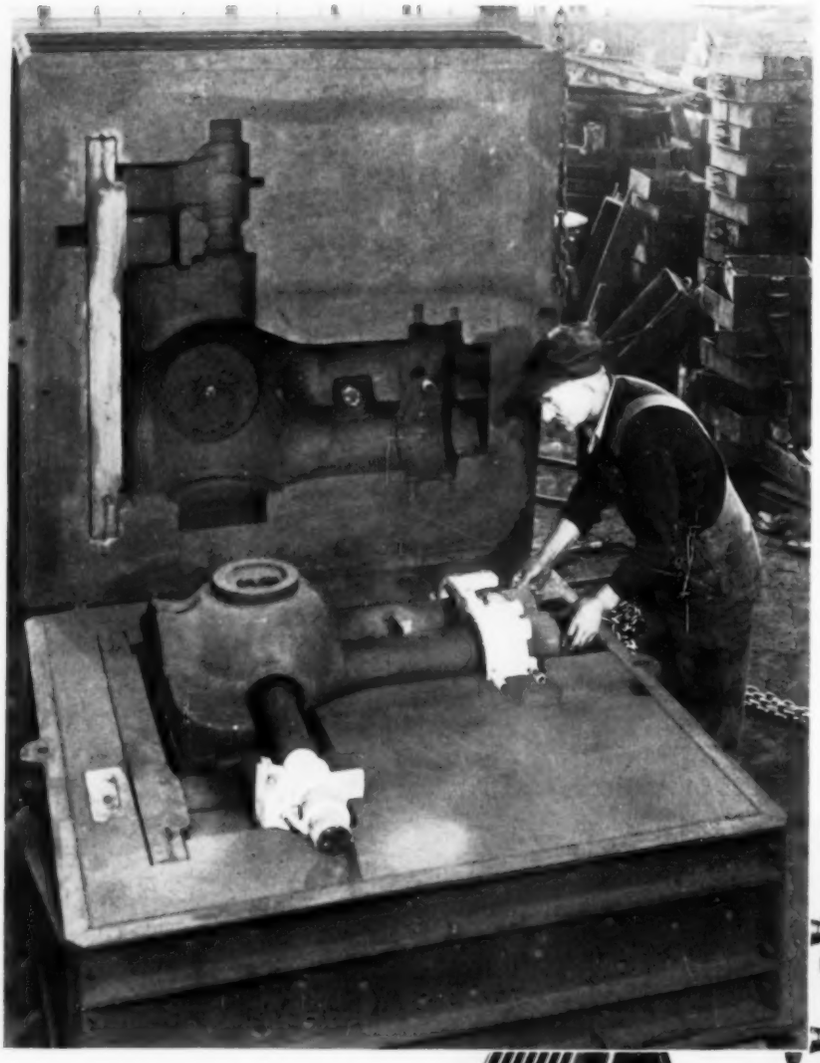
Contents

VOLUME 67

NUMBER 2

FEBRUARY 1939

	PAGE
Editorial	21
Shop Control Methods Cut Production Losses *By Charles Zust*	22
New Steel Foundry Meets Exacting Requirements *By Lee E. Everett*	24
Nonferrous Foundry Has Wide Range of Alloys Available *By N. K. B. Patch*	26
Bill Celebrates Twentieth Anniversary	27
Foundry Industry Continues March of Progress	28
Cast Bronze Bells in Mexico *By H. H. Miller*	30
Among Detroit Foundries *By A. H. Allen*	32
A.F.A. Program Stresses New Developments	33
Questions and Answers	34
Men of Industry	38
Activities of Foundry Groups	44
Adventures of Bill *By Pat Dwyer*	56
London Congress Offers Attractions	60
Readers Comment	82
European Foundry Practice	86
Obituary	88
New Equipment and Supplies	90
Foundry Activities	96
New Trade Publications	98



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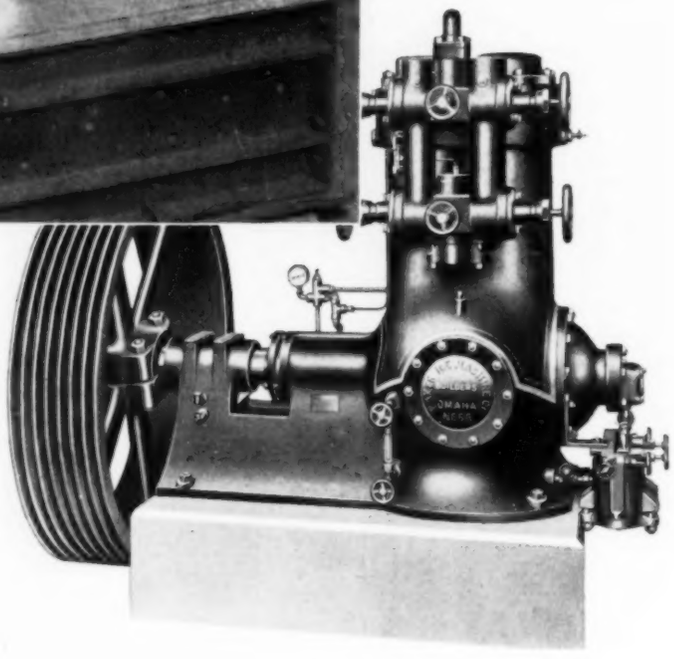

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1000 lb. casting for Baker Ice Machine Co. compressor

1200 lb. locomotive cylinder bushing 29" O D x 42" long.

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Editorial

Management Must Set Stage For Good Housekeeping

A SHORT time ago we witnessed a foundry executive proudly showing a number of his plant photographs to a group of friends. These pictures were prepared especially for aiding salesmen in telling customers of the specialized manufacturing facilities provided by the foundry. The photographs were remarkable examples of modern industrial photography and showed in exceptional detail every department of a clean and orderly plant. Before anyone in the group had time to make the obvious comment, the plant executive explained that the foundry was not cleaned up for the occasion. His statement, "We keep our foundry clean at all times," emphasized the pride of accomplishment.

During the past few years, the foundry industry has made considerable progress in furthering good housekeeping practices. Where management has realized the many savings possible through maintaining a really clean plant, and where the necessary time and effort has been expended in selling foremen and workers on the necessity and value of orderliness, exceptional results have been secured. Outstanding examples of excellence in good housekeeping practice may be found in every part of the country. Many more are needed.

Interesting factors which must be considered carefully in starting a good housekeeping program, recently were outlined by A. D. Lynch, industrial relations manager, J. I. Case Co., Racine, Wis., speaking before a meeting of the National Founders' association. His experience and observation have shown that, as is universally true in all endeavor where educational or training programs are to be carried on, management must do certain things before any program of that nature will be accepted. Before it is possible to obtain a clean plant, order must be secured. Order can be had only when all unnecessary objects have been removed and all necessary materials, equipment and tools are in their proper places. Foremen and workers cannot meet this definition of order unless management provides proper places for all necessary operating items and prepares proper storage facilities for things unnecessary in one operation but necessary in another. In addition, operations creating dust must be controlled with exhaust and dust collector systems.

Not until these conditions have been provided, is management ready to train foremen and workers, according to Mr. Lynch. Because many employes have been accustomed to conditions less than clean and orderly, they must be given a clear picture of just what is demanded. As the good housekeeping program progresses, and cleaner surroundings predominate, workmen unconsciously will create less dirt and disorder. Methods to maintain interest and perpetuate the job may be devised to meet local conditions.

Joint Effort Beneficial

EVERYONE knows that co-operative research has proven beneficial in numerous industries, including several specializing in the field of castings manufacture. Without reflecting in the least upon the immense progress made by the gray iron foundry industry during the past 10 or 15 years, it does seem possible that joint effort in the past might have provided answers to many problems which now are pressing for solution.

Our British contemporaries have gone far in that direction. The annual report of the British Cast Iron Research association, according to the *Foundry Trade Journal,* indicates steady progress. The organization has a staff of about 40, and its laboratories and offices cover about 12,500 square feet. A small foundry with about 2500 square feet for experimental work recently was begun.

The report shows that during the year it has been found possible to obtain refined graphite irons, that is of the so-called eutectic or supercooled type, from the cupola. An intimate connection has been found between graphite size and shrinkage. A new type of heat-resisting iron containing aluminum has been developed. Notable progress has been made on the separation and estimation of nonmetallic inclusions in cast iron and pig iron. A preliminary report has been prepared for the Institution of Mechanical Engineers on high-duty iron for engineering purposes.

THE Readers' Service department calls attention to the fact that the index of volume 66 of THE FOUNDRY, covering all material published in 1938, now is available. This will be sent free upon request of subscribers.

Frank G. Steinebach
Editor

Fig. 1 (Above)—Front or face side of production record card. Fig. 2 (Right)—Reverse side of production record card. Fig. 3 (Right below)—Production program sheet containing all information for various molding, coremaking, cleaning and shipping floors

THE small jobbing as well as the large production foundry has to meet problems in the control of production that may mean losses or profits in operating. The haphazard way of producing castings according to the formula of "making anything at any time" gradually is becoming obsolete, due to its being uneconomical in a competitive market. It is wasteful if considering set-up time, handling of pattern and flask equipment, or unutilized capacity. It is harmful to the organization if overtime must be substituted by off-days due to production run wild. Many foundrymen have found that it may be less important to lose an order than to lose position or money in the manufacture of castings. Most of the foundries that made money all during the depression, work in one way or another under positive production control.

Reasons for intelligent control of production in the foundry are well known. Only a few instances are here enumerated to stress its importance comparable with cupola practice, mixing by analysis, etc., to which much greater attention has been given in the past. Production control in many places is represented where the foreman picks up a pattern and some core boxes. He gives these to the molder and core maker with verbal order to make one or more castings at once if any suitable flasks can be found.

Production control becomes a necessity:

1. If orders are delayed in the office. All orders thus become rush orders, and operations in the foundry are uneconomical due to excessive set-up time, flask transportation, core waste, irregular number of charges per heat, and defective castings.
2. If numerous orders remain open for unreasonable periods.
3. If chasing identical castings by different individuals at the same time creates overproduction.
4. If castings are made without definite orders.
5. If quantities on existing orders are increased or reduced upon verbal instructions.
6. If defective castings on the molding floors and in cleaning departments are not followed up.
7. If core production goes far ahead of molding,

Control Methods Cut Production Losses

By CHARLES ZUST
Otis Elevator Co., Yonkers, N. Y.

creating: (a) Waste in cores, kept for weeks on racks before being used. (b) Duplication in production of cores, by ignoring cores in stock.

8. If patterns and coreboxes are released so that storage facilities in the foundry are jammed, creating: (a) Misuse of and damage to patterns in handling; (b) Neglect of patterns, remaining in the foundry for long periods without proper care; (c) Confusion in selecting coreboxes of similar appearance, either in foundry or pattern storage when returned from the foundry.

9. If the clerical work is excessive due to order forms and tags handled by foremen, clerks or molders.

10. If there is no consolidated information available with regard to the manufacture of a casting, but only as carried by memory, or if trial and error method is in use too often.

Before any control of production can be established intelligently a measuring stick for work performed must be created. This is either accomplished by the piece work method, based on past and *should be* performance, or the further advanced time study and motion study combination where a base rate is maintained irrespective of castings produced. In either case definite time values per casting are established beforehand. Data collected over a comparatively short period will produce ready charts from which time standards can be set for any new job upon such elements as flask or sand volume, parting area, draw, touch up, and such incidentals as black dust, gaggers, nailing, skin drying values, etc.

Time standards also are (*Please turn to page* 66)

IRON - FOUNDRY — PRODUCTION PROGRAM

FORM Y-1924 (10-34) — WEEK ENDING May 14, 1938 (4 Heats) — ROLLOVER M/C

(1) Loose: Bench (2) Loose: Floor (3) Roll Over and Jolt (4) Squeezer

Name Part No.	Pattern and Core Boxes	Amt.	On Order No.	Metal - Weight	Core-Sets Upper	Core-Sets Lower	Shipping						Remarks
Body	2-DC-1	60	HW51087, 3/8 — =	C.I. 37	2/2								A-4-3 2W/B
				All, or balance of order)									
Guard	54-GOV-2	100	Henry & Co. — 4/15	S.S. #1 9¼	1/2								A-6-1 5AL/2B
Frame	54-GOV-4	100	Henry & Co. — 4/15	S.S. #1 46		1/1							A-3-5 1AL/B
Weight	S-160	100	#8. 4/11 —	C.I., 62		1/2							A-1-2 1W/2B
Bracket	268-CO-2	200	#1. 4/23 + =	C.I., 19	2/2								C-13-4 4AL/2B
				More on order, pattern to remain in foundry)									Rush
Base	M-7228	30	#4. 4/18 +	S.S. #2. 63	none								B-1-2 2W/2B
Bearing	~~M-9118~~	~~30~~	#7 4/30	C.I., 110	1/1	2/3	5/10 8	5/11 10	5/12 6	5/13 6	5/13 4	B-6-4,	1AL/2B

"crossed off as completed."

"posted as produced"

"in red" defectives

Pattern location. "on Patt. storage copy only."

Copies to: Pattern storage, Core making, Rollover molding floor, Cleaning - Shipping.

New

Steel Foundry Meets Exacting Requirements

By LEE E. EVERETT
Foundry Superintendent
Key Co., East St. Louis, Ill.

SEVERAL factors stand out prominently in considering the foundry practice required by the limitations imposed on fittings for the oil refinery industry. Cleanliness, accuracy, uniformity and freedom from even minute pin holes indicate the desirability of dry sand practice. Distortion and the susceptibility of several designs to shrinkage cracks render the choice of dry sand less obvious. Experience has indicated that skin dried molds offer the most practical solution. Weak and extremely permeable sand with a strong mold wash impart a smooth, hard surface to the mold that resists penetration and thermal attack much better than green sand. The skin dried mold does not offer the resistance of the dried sand mold to contraction. The skin dried mold has several inherent production advantages, lower cost, greater speed, less expensive equipment, ease of shaking out, etc.

Adequate resiliency and greater freedom from gas and sand defects also indicate the desirability of skin drying over ordinary green sand practice. A great number, probably the majority of pressure fittings, especially the smaller sizes at present are made satisfactorily in green sand molds. However, skin drying reduces the hazards to a considerable extent and with proper rigging increases the cost only slightly.

Molding sand standards include 2.5 pounds green shear strength, 7 to 9 pounds green compression, and a low dry compression of approximately 40 pounds, moisture content 1.8 to 2.2 per cent and permeability 300 or higher. In the sand preparing unit, scale dials are mounted over the mills. Sand for each batch is weighed automatically. Water is metered accurately and the utmost care is taken to insure accuracy of composition.

The sand handling system was designed by the National Engineering Co., Chicago with shakeout unit and screens supplied by the Link-Belt Co. From the shakeout the sand is carried over a magnetic pulley, through a breaker screen, into an elevator and discharged over a 2-deck vibrating screen to the storage hoppers over the mullers. Over size and fine particles are eliminated by the classifying screen and with an exhaust system permits close control of fineness and permeability.

An under ground conveyor brings sand from the yard storage bin and delivers it to the elevator referred to in a preceding paragraph which discharges into the new sand bin. The system is interlocked electrically and mechanically so that new sand cannot be loaded into the old sand bin, or vice versa. The storage hoppers discharge into automatic weighing hoppers over either of the two mullers. These hoppers quickly can be adjusted to weigh any amount of sand up to their capacity and are accurate within about 2.00 per cent.

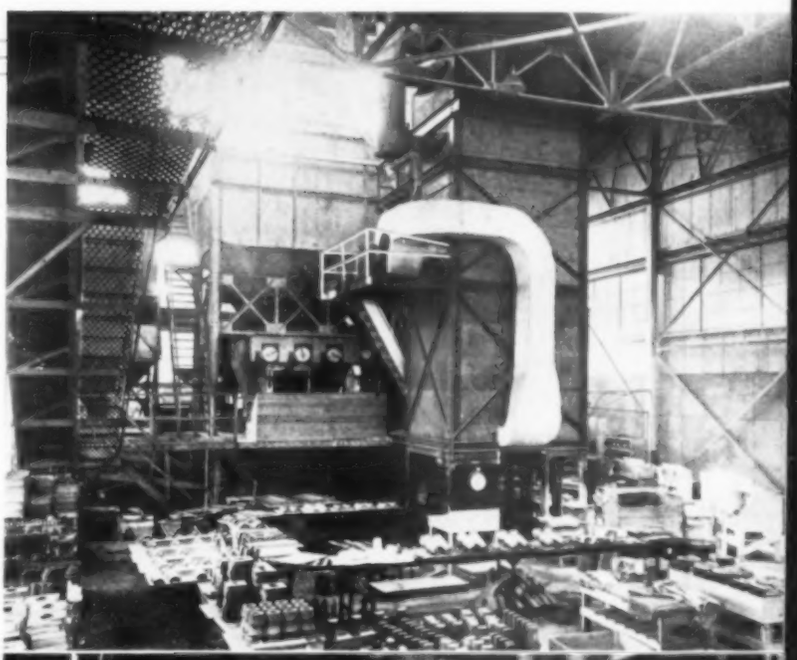
One muller discharges on to a belt that feeds an aerator which in turn feeds the distributing conveyor that carries the prepared sand to the storage hoppers over the molding machines. The second muller is arranged to discharge into the main system or through an aerator into the core sand buggy for distribution in the core room. Various binders are stored in bins in the

This is the second and concluding section of a paper presented before a regional foundry conference at Rolla, Mo., under the joint sponsorship of the St. Louis District Chapter of the A.F.A., and the Missouri School of Mines and Metallurgy. The first section of the paper appeared in the January issue of The Foundry

and oil, or rosin. Cores on the plates are sprayed with an oil silica wash and dried in a tower type oven shown in Fig. 8, designed and erected by the Foundry Equipment Co., Cleveland. This oven extending 36 feet above the floor is provided with 81 shelves 28 x 66 inches, has a recirculating air system, burner capacity of 500,000 B.t.u. per hour automatically controlled. Operating cycle is 1 hour and 50 minutes at 530 degrees Fahr. Dried cores are hollowed out, pasted, gaged, joints filled, and then a second coat of silica wash is applied by spray or brush. The cores then are re-dried in an oven, re-gaged, checked and placed in the *ready* racks or taken to the bay where the molds are closed. No person has permission to use cores without the second checking.

In closing the molds extreme care is taken to insure perfect cleanliness. Every mold is gaged after the cores are set. Metal thickness (*Please turn to page* 72)

Fig. 7 (Left)—Ladle with 1¾-inch nozzle pouring into a 1600-pound casting. Fig. 8 (Below)—Tower type oven used for drying cores after spraying with an oil-silica core wash. Fig. 9 (Bottom)—Special peal or fork is employed to load and unload the heat treating furnace



sand mill platform and are measured accurately for each sand batch.

Molds are made on a battery of jolt rollover pattern draw machines supplied by the Herman Pneumatic Machine Co., Pittsburgh. The machines are equipped with automatic timing devices to insure uniform jolting on every mold. The sand is rammed very hard to prevent swells on the castings and the mold surfaces are sprayed with a silica flour and oil wash. This wash not only creates a hard dense surface on the mold to resist metal penetration, etc., but also tends to waterproof the surface and thus discourage sweating if the molds are left closed for long periods.

Molds Skin Dried in the Oven

Molds are torch dried to apparent dryness at a depth of ½-inch as determined by cutting into core print or joint surface. Molds placed in the ovens are dried for 1¼ hours at a temperature of 500 degrees Fahr. in a specially designed continuous conveyor type oven shown in Fig. 11 and built by the Foundry Equipment Co., Cleveland. With an air circulating unit of 30,000 cubic feet per minute and 2,000,000 B.t.u. per hour heater capacity, this oven dries the average 12 x 24 x 30-inch mold to a depth of 2 inches and can handle about 40 molds per hour.

Fittings require cores that will collapse readily, but clean surface on the castings necessitates the use of a core that will not cut or scab. Cores are made from a weak green strength mixture bonded with cereal

Nonferrous Foundry Has Wide Range Of Alloys Available

By N. K. B. PATCH

IMPURITIES in yellow brass alloys, previously mentioned in the January issue, should be kept below the following maximum if best results are to be obtained: Iron, 0.25 per cent; phosphorus, 0.01 per cent; antimony, 0.10 per cent; sulphur, 0.05 per cent, and aluminum, 0.30 per cent.

It is interesting to note that where an excess of iron is present, shrinkage of alloys is more marked and consequently more feeding is necessary. Presence of phosphorus and zinc in the same alloy is antagonistic and frequently causes gassing and discoloration of the castings. Antimony invariably causes hot shortness and consequent brittleness during the cooling stage that may result in undesirable microscopical cracks, which later develop serious weakness.

Excess sulphur tends to reduce the tensile strength. Aluminum, of course, tends to make drossy spots on the surface, unless the metal enters the mold very quietly. It promotes a tendency to leakage where the castings are subjected to pressure. Many specifications specifically prohibit the presence of aluminum, which would mean that the maximum should be set at a trace or 0.01 per cent. Nickel frequently is permitted in these alloys, for example, up to 0.5 per cent, to refine the grain and effect an increase in density. Since yellow brasses have a greater shrinkage than red brasses during solidification, they require more feeding by the presence of adequate risers.

Metal for these alloys must be poured into the molds as rapidly as possible thus filling the molds in as short a time as conditions will permit without harm to the form, shape or structure of the mold itself. Otherwise smoke spots and scum spots invariably will appear in these high zinc yellow brasses.

In measuring temperatures by the use of pyrometers, the operator must be careful to read the temperature well below the surface of the bath, since the surface is covered by zinc oxide. Frequently where the surface has just been disturbed, the zinc oxide is just forming through the combustion or burning of zinc at that point, giving a false reading if the temperature is taken at the point of that combustion.

Compositions *Q*, *R* and *S* (Table I, THE FOUNDRY, for January, page 33) are a series of yellow brasses which have become more or less standard for the production of certain specific castings. Composition *Q* is for brass castings to be brazed. Compositions *R* and *S* are for brasses to be brazed, but lower in copper and higher in zinc to cheapen the composition cost. Since the zinc is increased, it will be found necessary in brazing to use some form of flux, the most common being borax.

Compositions *T*, *U*, *V*, *W*, *X*, *Y*, *Z*, and *AA*, embrace a series of compositions which might be termed yellow brass containing lead and hardened with tin. These are sometimes known as leaded yellow brasses. It will be noted that this series varies from 16 to 35 per cent zinc, which means that the color of these varies from a sort of red yellow brass to a truly yellow brass, approximating the true yellow brass color of muntz metal. Consequently, this series indicates a line of yellow brasses from which a choice may be made of the composition to match any of the variety of colors available in the drawn or wrought materials, such as tube, or sheet, or rod.

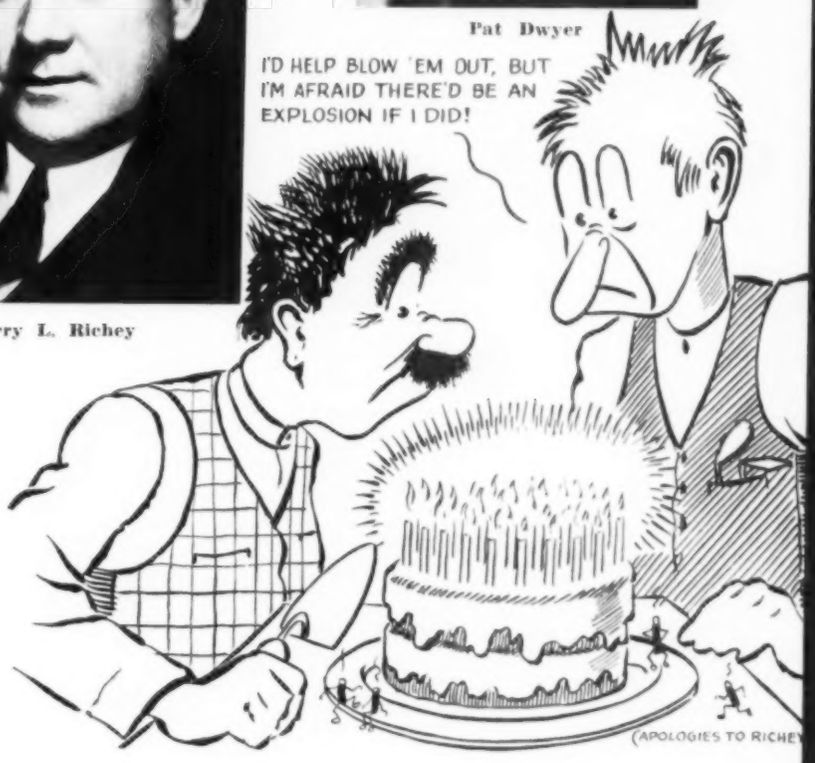
Composition *T* is used largely in the production of faucets, cocks and bibbs by manufacturers of plumber's brass goods. Composition *U* likewise is used in production of plumber's brass goods, but contains less tin, which is compensated by an increase in the zinc. The composition is slightly less expensive and if handled properly gives a satisfactory casting. Composition *V* it will be noted is composition *T* with lower copper and a consequent increase of zinc, resulting in a little more yellow color and a slight decrease in the cost of the ingredients. That composition is used for light castings or ornamental work not requiring strength or resistance to pressure test. Some manufacturers permit up to 0.02 per cent aluminum to make it easier to cast. Compositions *W* and *X* are yellow brass compositions similar to those just described but zinc is increased so that the cost of the elements making up the composition is decreased. They also are used for production of plumber's brass goods and other yellow brass fittings such as builders hardware and the like. Composition *Y* and *Z* are used largely for yellow brass castings of heavier section than those previously described. Obviously they tend to produce true yellow color more nearly than *T*, *U* and *V*, since the zinc content is much higher.

In some instances manufacturers do add up to 0.05 per cent aluminum to keep down smoke nuisance and reduce smoke spots on castings. Composition *AA* approximates muntz metal with 2 per cent lead added. This composition does not contain tin. It is used commonly for the manufacture of plumbers' flanges, scupper pipes, etc. where cheapness is a prime requisite. In this series of yellow brasses, (*Please turn to page* 63)

Bill Celebrates Twentieth Anniversary

Pat Dwyer

Harry L. Richey



TWENTY years ago this month, in the February 1919 issue, THE FOUNDRY presented the first of an exceptionally long series of stories portraying the interesting adventures of the now famous foundryman, Bill. An entertaining and in many ways instructive chapter in the varied life of that well known foundry character, created by Pat Dwyer and illustrated by Harry L. Richey, has appeared in every issue of this publication, save two, during the past two decades. Because the artist was in the hospital and unable to make the illustrations, the Bill story did not appear in the Aug. 1 and Aug. 15, 1922 issues.

This undoubtedly establishes an all time record for continuity of presentation, not only in the field of the business and technical press, but also among magazines of all classes. Few authors, illustrators or characters succeed in holding the attention of the reading public for so long a period of time in this ever changing world.

Friends of Pat Dwyer often marvel at his ability to produce an interesting and entertaining story, issue after issue, without returning to the paths followed in the early days of the series. Perhaps a few statistics may indicate the enormous amout of effort expended by the author and illustrator in keeping Bill a living character for readers of THE FOUNDRY during the past twenty years.

During the twenty year period since 1919, "The Adventures of Bill" has been presented in 396 issues, requiring in excess of 1000 printed pages. Mr. Dwyer has written more than a million and a quarter words in describing the trials and tribulations of his good friend Bill, and Mr. Richey has prepared approximately 1250 humorous drawings to better acquaint the reader with the most unusual situations encountered by Bill, both in and out of the foundry. As a matter of comparison, the amount of material thus far published about Bill would fill four books the size Margaret Mitchell's *Gone With the Wind*, or ten novels of ordinary size.

But Bill receives only incidental attention, for Pat Dwyer is engineering editor of THE FOUNDRY and in that capacity has prepared hundreds of articles on practically all phases of foundry practice, and is the author of the book, *Gates and Risers for Castings*. Harry Richey formerly was in charge of the editorial art department of the Penton Publishing Co., publisher of THE FOUNDRY, but now is purchasing agent of that company and manager of the Penton Building.

Success of the Bill series in holding the continued interest of both the older and the younger generations of foundrymen has been due to the unique attributes of the author. Rare ability as a writer, unusual knowledge of all phases of foundry practice gained in plants scattered over most of the Eastern portion of the United States and in Nova Scotia, and a splendid insight into the mysteries and foibles of human nature, have permitted Pat Dwyer to make "The Adventures of Bill" both entertaining and instructive to the vast majority of readers. Likewise, talents for emphasizing the grotesque have caused (*Please turn to page* 42)

Foundry Industry March of

PROGRESS in the development of both foundry practices and products continued during the past year, even in the face of depressed operating conditions. Marked improvement may be noted in the equipment, materials and methods utilized in making practically every class of casting. Developments have taken place not only in the gray iron, malleable, steel and nonferrous branches of the foundry industry, but also among the manufacturers of foundry equipment and supplies.

In preparing a summary of progress in the field of castings for its Jan. 2 Yearbook of Industry issue, *Steel* recently solicited comments from numerous leaders in the foundry and allied industries. Since the replies which have been received provide a comprehensive symposium on past and present trends, they should be of particular interest to readers of THE FOUNDRY.

Pearlitic Malleable Can Be Produced To Meet Widely Varying Conditions

By H. A. SCHWARTZ
Manager of Research
National Malleable & Steel Castings Co., Cleveland

PERHAPS the most interesting feature regarding current developments in pearlitic malleable iron is the increasing interest taken in its various forms both by the producer and consumer.

So far the properties desired for various purposes differ rather widely and correspondingly the materials offered by various vendors are adapted to a considerable variety of service conditions. This would, for the present, seem to be a rather healthy sign as demonstrating the versatility of that material.

Perhaps as the years go by there will be some possibility of the standardization of properties desired and methods of manufacture leading to a reduction in the number of such materials on the market. Committee A-7 of the A. S. T. M. has had the matter of specifications for pearlitic malleable under advisement for some time and expects to clarify this situation in the form of specifications as rapidly as the crystallization of opinion may make possible.

West Coast Foundries Progress in the Production of High Quality Castings

By CHARLES J. P. HOEHN
President
Enterprise Foundry Corp., San Francisco

THE West coast has made real progress during the past year in producing castings of quality equal to the best produced in the U. S. A.

Progressive iron foundries have found it necessary to equip themselves to produce high test alloyed gray iron in competition with widely advertised brands of gray iron.

Steel foundries are on their toes to meet this competition and are producing castings equal in appearance to gray iron and of remarkable strength and uniformity.

Given fair labor conditions the West can and will continue to make a fine showing in the foundry industry.

Better Control and Greater Uniformity Of Operation Secured by Mechanization

By R. E. PRUSSING
Vice President
Whiting Corp., Harvey, Ill.

MOST significant of trends observed in 1938 is increased interest in mechanization of all kinds as an aid to better control and greater uniformity of operation, as well as a reduction in production costs.

For this reason, foundrymen are concerned more than ever before, with equipment and methods eliminating hand labor. As a consequence, materials-handling equipment and mechanical charging systems have received far more consideration than at any time past.

Nor is this interest confined to large plants. The skip

ry Continues *Progress*

hoist charger which Whiting introduced a few years ago particularly is suited for serving smaller size cupolas and several installations were made in 1938. As we see it, interest in this equipment will increase and more installations will be made, especially if castings demand keeps up.

In the same class is desulphurizing cupola metal in insulated U-ladles at the spout. Many installations were made during 1938 because foundrymen learned that they get more uniformly desulphurized metal, can use larger percentages of scrap in cupola charges and thus reduce cost of iron at the spout, frequently as much as $2.00 per ton.

In the malleable division the thing of greatest interest now is duplexing equipment for melting. During the year we have made several additional installations for duplexing from cupola to pulverized-coal-fired air furnace. In addition to greater economy, duplexing provides a continuous supply of hot metal for use in conjunction with mechanized molding methods.

Steel Castings Established as Valuable And Proved Engineering Materials

By FREDERICK A. MELMOTH
Vice President
Detroit Steel Casting Co., Detroit

PARALLELING practically all productive industry, the year 1938 has been one of stress and declining output in the steel castings industry. In spite of this there has existed an activity technical in character, common to all branches of the casting industry in some degree, but especially marked in steel castings, and of unusual importance.

Castings, proponents of alternative methods and materials to the contrary, are establishing themselves as a proved and increasingly valuable engineering material.

Their field of application is steadily enlarging, and published details during the year describing their use in applications hitherto not considered practical or advisable offer adequate confirmation.

An understanding of the potential physical properties of cast-to-form articles, and their controlled realization as a result of good steelmaking practice, alloy content where necessary and economic, and accurate heat treatment are factors of real importance in defining casting trends.

The industry as a whole is becoming technically stronger, and is also insuring that accurate knowledge of its technical advancement reaches those points where a well-formed impression could do most ultimate good.

The Steel Founders' Society (*Please turn to page* 78)

Cast Bronze

By H. H. MILLER
Miller Brass Foundry
Torreon, Mexico

SEVERAL years ago while looking over the numerous churches and bells of Chihuahua, which by the way is not pronounced Chi-hooah-hooah as you might suppose, but the extremely simple Tche-wa-wa, with the letter *a* short as in *at* and with the accent on the first *wa*, while looking around the place I came across a neglected church away outside the city limits. The tower held an old misshappen cracked bell that may have come from Spain.

A bright eyed, black haired little girl playing in an old shack in front of the church readily entered into conversation touching on the past and present condition of the church and the bell. Her childish candor and innocence, than which a traveler will find nothing more attractive if he girds on the wings of the morning and flaps around the earth till he's dead, was fairly typical of a species of affection and reverence with which Mexicans, especially those in humble circumstances, regard their church bells. Shape, size and tone are factors of minor importance. They respond as readily to the clangy, discordant, cracked old bell of a ranch or village chapel as they do to the great booming bell knelling its bold notes free from cathedral shrine.

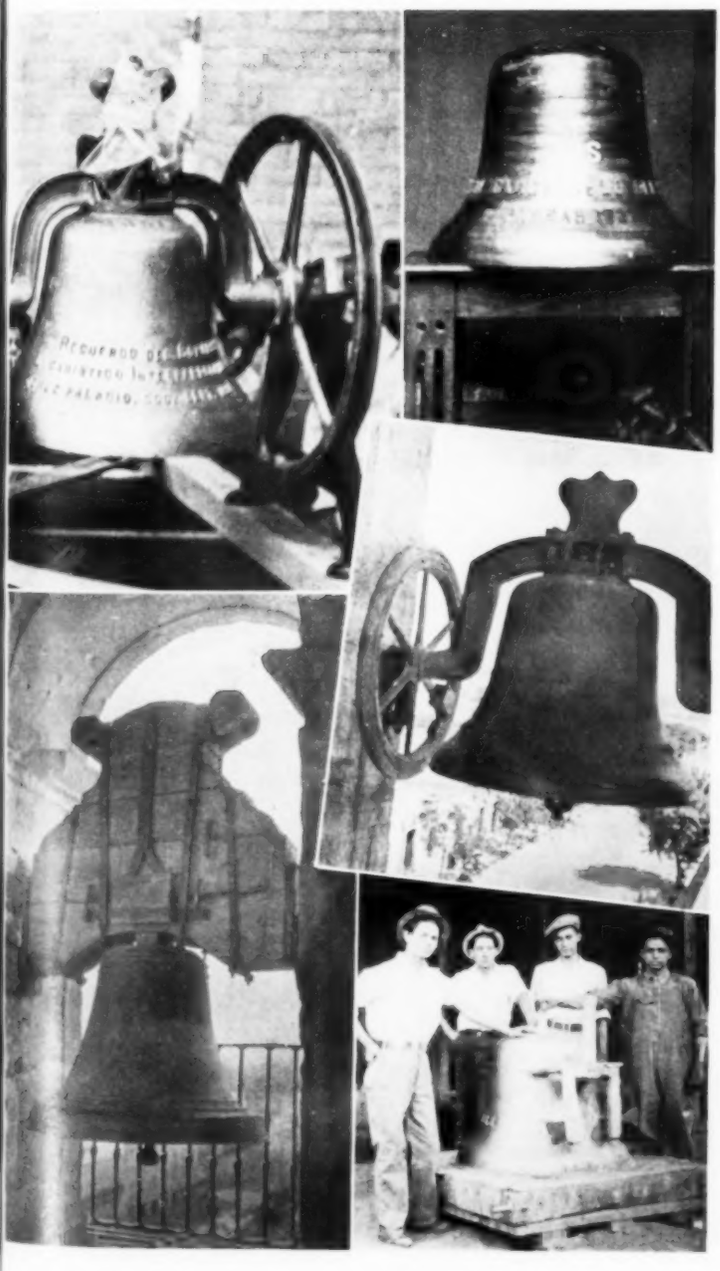
When I asked her how the old bell sounded, the truth was in her eyes and in the momentary flash of white teeth as she assured me "Muy bonita." Judging from the shape and condition, the old relic could not possibly have a tone resembling that of a real bell. Nevertheless the sound was sweeter than the horns of elf land faintly blowing, to the ears of this little Indian maiden, even if her limited vocabulary was confined to "Very pretty".

Valor and Piety Go Hand in Hand

Once while a revolution was in full swing, just a revolution, offhand I cannot remember which one, a poorly clad, middle age woman came to my foundry to see about getting a bell. I showed her one I had just made which she could have for 150 pesos. She reluctantly admitted that she did not have that much money. To my inquiry as to where she stood financially, she peered around to see that no person was within hearing, then leaned over confidentially and whispered that she had 100 pesos.

She came from a little place in the neighboring state of Durango where she had labored for months collecting the sum, in little dribs and drabs of a few cents at a time from the poor people of her congregation who yearned to have a bell of their own. She had tramped all the way on foot with no money for food or lodging. The night before she appeared at the foundry she had slept or tried to sleep on the ground in the open air near the railroad station among as fine of crowd of thieves, cut throats, reeves, draw latches and general riff-raff as ever hung on the skirts of a revolutionary army. If they had a suspicion that she had the money on her person,

Bells in Mexico



her journey would have been over rather permanently.

She was no haughty or voluptuous senorita rustling in silk, but she was a lady, honest, sincere, devout and courteous, prevalent characteristics of the women of her race and I was complimented when she proposed to leave the money with me, pending her effort to raise the remainder. I gave her a letter designed to aid her in this worthy cause. The money she had with her was all in silver and mostly in small denomination just as she had collected it through untiring effort over a long period. With faith properly fortified she returned to her home and came back about three months later, happy and triumphant with the 50 pesos. I shipped the bell, express charges prepaid, to her pueblo and only regretted that I could not be present to witness the rejoicing of the congregation over the arrival and the subsequent consecration ceremony by the bishop. The bell was one of the old style, suspended from a beam and rung by swinging the clapper.

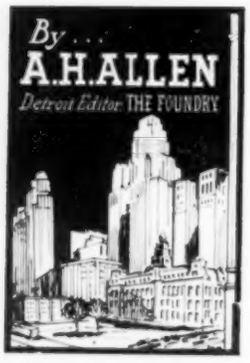
Bells Give Rise To Curious Legends

With the peculiar attitude of the people toward bells, and with the wide variety of bells found in all parts of the country, it is only natural that the history of certain bells is more interesting than that of others. Unfortunately, history promulgated and repeated by word of mouth is not always strictly accurate. Therefore you are free to accept or reject the story of a tourist in a remote section of Mexico who discovered a locomotive bell hanging in the tower of the village church. He learned that for many years the congregation had yearned and prayed for a bell, but through the usual and chronic financial stringency, never had a chance to gratify their desire. Finally a friendly bandit going quietly about his business in that part of the country learned of the situation. In common with prominent men in all walks of life he subscribed to the well known motto *Do It Now.* With a wild band of mounted journeymen bandits whooping at his horse's tail he journeyed to the nearest railroad and waited for the first train to pass through a lonely and uninhabited section. His men joyfully ripped up a few rails and then had a cigaret or two before a locomotive jumped from the road bed and laid down on its side in the ditch on one side of the railroad right of way. History is discreetly silent on whether the driver and firemen jumped in time or stayed at their posts but that is of no consequence.

While the chief and certain trusted followers relieved train crew and passengers of anything worth lifting, a couple of mechanically inclined lads lifted the bell from the locomotive. (*Please turn to page* 82)

Group of pictures showing several types of old time bells, pattern for a modern bell interior of foundry and molding group, lower left and right, and latest bell decorated for the consecration ceremony, upper right center, with H. H. Miller in left foreground

Among Detroit Foundries



ONE of the largest companies active in the field of nonferrous casting operations is the Federal-Mogul Corp., Detroit, a leading supplier of bearing metals, steel-backed and bronze-backed bearings and bushings, bronze propellers for marine craft and a wide assortment of special products.

Called upon to furnish thousands of types of bearings of varying chemical analyses and physical properties, the company must take particular pains to exert rigid and constant laboratory control over all melting processes divided into two general classes—white metals and bronzes.

White metals are melted in two sets of coke fired furnaces, one for tin base and lead base metals and the other for cadmium base compositions. The former type is melted in five 5000-pound capacity cast iron pots and the molten mixture is poured into cast iron pig molds which travel on a conveyor adjoining the melting units. The 50-pound pigs are remelted in the babbitting department.

Preparation of babbitt metal is no simple task. The melting pots are tended by specialists who can recognize instantly when certain impurities are present by appearance of the molten metal. For example, traces of iron alter the appearance of the bath, and must be removed by metallurgically controlled refining methods.

Cadmium base babbitt is prepared in similar furnaces hooded for fume removal. A typical cadmium mixture will show 0.5 per cent copper, 0.75 per cent silver and the remainder cadmium. About 35 pounds of silver is added to the bath in the form of small shot. A flux covers the bath during melting.

Charges in the babbitt furnaces may contain return material as well as virgin metal. Particular care must be taken to insure high purity and correct analysis in the return metal. Every effort is made to recover the maximum amount of return metal. Steel turnings from the machining department, for example, are shoveled into a reverberatory furnace where the babbitt is sweated off before the turnings are consigned to scrap. If impurities are too high in recovered metal, they are melted and removed in this same reverberatory furnace. Another furnace is available for removing certain impurities from cadmium turnings through a specialized process developed by the company's metallurgists.

In the bronze casting division, 16 crucibles in coke fired pit furnaces melt down various types of bronze where relatively small heats are desired. Charges for these crucibles, average weight 250 pounds, are weighed carefully in tote boxes. Each box carries a printed card showing exactly the composition of the charge and its destination. When the material is placed in the crucibles, the cards are hung on nearby hooks and later are collected for checking by the laboratory, and then placed on (*Please turn to page* 64)

Two rotary oil-fired furnaces of 1000-pound capacity for melting bronze. Illustration courtesy Federal-Mogul Corp., Detroit

A. F. A.

Program Stresses New Developments

Upper right shows a view of the Netherlands Plaza hotel at which numerous sessions will be held. Hotel Gibson at the right will be the official headquarters for the annual convention

SECTIONAL program committees of the American Foundrymen's association have planned an unusually interesting and extensive series of papers and committee reports for the forty-third annual convention to be held in Cincinnati during May 15 to 18. Some thirty-six sessions, covering the various phases of foundry practice and interest, have been scheduled.

The convention will open Monday morning, May 15, with registration headquarters in the Gibson hotel. While many of the sessions will be held in the meeting rooms of this hotel, others will convene in the rooms of the Netherlands Plaza. This will be the first A.F.A. convention held in Cincinnati since 1909. While there will be no exhibits, the week's program of meetings, plant visitation and entertainment features will make it one of the most attractive ever held. Local committees of foundrymen are being organized through the formation of an A.F.A. chapter to take charge of plant visitation, and other affairs planned by the Cincinnati area foundrymen, who will be hosts to the numerous members and guests of the Association present.

Program Covers Wide Range

Sessions listed on the schedule cover through their papers, many new developments in the management, mechanical operation, metallurgical, and shop practice phases of foundry practice. Management sessions include those on cost methods, foreman and apprentice training, safety and hygiene, and time study. Each of the major divisions, namely—steel, malleable, nonferrous and gray iron—is planning a round table luncheon meeting for the discussion of special problems. The gray iron division also will sponsor a shop operation course of four sessions, which is under the direction of a committee headed by P. T. Bancroft, Moline, Ill., who has directed this course so ably the past few years.

The malleable division program is being organized by its committee under the chairmanship of Carl Joseph, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich., while Lester N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala., is chairman of the committee planning this division's round table meeting as part of the program.

Papers tentatively listed for the malleable sessions will be on "Atmosphere Control in Malleablizing"; "White Iron for Malleablizing"; "Comparison of Grinding and Shearing Gates on Malleable Iron Castings"; "Effects of Manganese on Second Stage Graphitization"; "Melting White Cast Iron," and "Occurence of Hydrogen in White Cast Iron."

T. N. Armstrong, International Nickel Co., New York, heads the steel division program committee, which this year has three sessions planned, a special undertaking being a symposium on melting practice. Papers for the symposium are: "Acid Electric Melting"; "Basic Electric Melting"; "Acid Open Hearth Practice"; "Basic Open Hearth Practice"; "Converter Practice," and "Induction Furnace Practice."

The nonferrous division sessions are being developed by a committee under the chairmanship of William Romanoff, H. Kramer & Co., Chicago. Some subjects of papers for the nonferrous sessions are: "Effects of Aluminum and Antimony on the Physical Properties of Red Cast Brass"; "High Conductivity Copper Castings"; "Plaster Mold Process"; "Nonferrous Founding," and "Crucible Melting."

Papers and reports for the (*Please turn to page* 71)

QUESTIONS and ANSWERS

Spongy Section in Casting Contains Sand or Slag

We have been trying to make cylinders 20 inches long which have an outside diameter of 11 inches and an inside diameter of 4 inches. A spongy spot appears about one-third the distance from the bottom, While we pour from the bottom through an inside core and bake the mold, we have tried pouring from the top, molding on the side, with hot iron and with cold iron. The machine shop reports that the spongy place seems to contain sand or slag.

Evidently you are encountering trouble from sand, dust or dirt being carried from one part of the mold to the other, and lodging on the face of the mold. We believe that if you will make the mold without a cope so that you can watch the molten metal rise during pouring, you will be surprised at the amount of scruff that rides the top of the rising metal wall. Also if some of that scruff tends to stick to the mold or core face, it can be dislodged with a small iron rod kept handy for that purpose.

In your sketch you indicate that the 7-inch header employed for feeding is only about one-half the thickness of the casting. We do not believe that such a header is of any great value because it will freeze before the casting does, and hence, will not fulfill its purpose. Make the header the same thickness as the cylinder itself. If you feel that you must pour the casting under a cope, why not try a cover core pierced with a ring of small pop gates, and a runner box or pouring basin built on top of the core?

Application of Silica Washes Vary with Mold Size

On cores for steel castings has it proven more desirable to apply silica wash before or after the cores are baked? Which is the best way to apply the wash, by spraying, brushing or swabbing?

Problem of applying silica wash before or after the cores are baked, and the further problem of the method of application resolve themselves into a simple question of convenience. Some cores can be washed more conveniently before they are placed in the oven, while others, especially those which lend themselves to the dipping process, can be handled more conveniently in the dried state. One objection to the after washing process is that unless the cores are washed while they are quite hot, they must be returned to the oven for a supplementary drying. So far as the ultimate result is concerned, the ability of the silica wash to prevent penetration of the steel, experience would seem to indicate that no particular advantage can be claimed by one method over the other.

Obviously the wash may be applied more rapidly with a spray gun than with a brush or swab. However, the method has certain limitations, particularly in the hands of men who are not sufficiently expert. Large, plain surfaces present no difficulty, but in deep pockets, irregular surfaces the distribution of the wash may not be uniform and an excess amount of solid material will be deposited in the bottom. In a general way it may be stated that American steel foundry practice favors dipping the small cores, swabbing or brushing the medium size cores and spraying the large cores.

Holes in Gate Valve Casting Due to Gas Evolution

We are forwarding one-half of a 1¾-inch gate valve which contains several holes on the inside opposite the gate. The casting is made from 85-5-5-5 metal of ingot, sprues, and machine shop turnings melted in an electric furnace. Metal is poured about 2200 degrees Fahr. and the molding sand has a permeability of 22 and the core sand 70. We have tried different core oils, longer periods of baking cores, but to no avail. The holes do not occur in all castings, but on only one or two in each mold. They are not always in the same position in the mold but change at different times.

Examination of the gate valve casting leads us to the opinion that the difficulty is caused by a slight disturbance of the molten metal caused by a small gas evolution from the core. Presumably, the core used in the casting is made in three parts; a central body with two flanges pasted on both sides. Possibly the paste in the few cases in which the trouble arises is not thoroughly dried. It may be that pasting is done while the cores are hot depending on the heat of the mold to dry the paste. In some instances the cores are a little cooler than usual, and consequently the paste does not dry as it should. The paste being a trifle damp generates a small amount of gas when

the molten metal heats it up, which causes a little kick resulting in the holes in the casting.

Another possibility is that the vents in the cores get clogged sufficiently to retard the free flow of gas to the outside of the mold cavity. The fact that you only have a little difficulty of the kind you mention indicates that it is some minor trouble occurring from time to time. However, sometimes locating the source of such trouble is much more difficult than if it were on a large scale.

Metal Must Be Poured Rapidly To Prevent Film Forming

We are having trouble in securing clean sharp saw tooth grooves, three to the inch on a chill face cast slip. The mold is set up vertically with a machined steel chill on the inside and three dry sand cores on the outside. The chill is warmed with hot metal before the metal is poured through pop gates from a runner box in the cope.

Metal starts to lose temperature and consequently to develop a film on the surface the instant it enters a mold. Manifestly the film is developed more rapidly against a chill than it will be against a sand face. Where the metal is poured slowly the film becomes strong enough to prevent the liquid iron from filling the saw teeth grooves in whole or in part. The obvious remedy is to fill the mold as rapidly as possible and thus reduce the formation and tenacity of the film to a minimum.

In the present instance we suggest a wedge gate on top, ⅜ x 4 inches where it is attached to the casting. The casting can be molded as readily in green sand with a chill on the bottom to form the grooves. Place a generous gate with two or three branches at the plain end connected to a runner and sprue sufficient in area to keep the gates filled. The position of the mold and the manner of construction are comparatively unimportant. The only really essential feature is to fill the mold rapidly.

Blow Holes Develop Over Nail Heads Placed in Mold

We are forwarding for your inspection a small casting in which three steel nails are cast. The bodies of the nails are in the sand, but the heads project into the mold where they are surrounded by the molten metal. A small button depression provides an extra thickness of metal under the nail head. Since we only pour metal every other day some of the molds remain on the floor from 30 to 35 hours. Apparently the nail heads condense a certain amount of moisture which is converted into steam and causes the blow around the nail heads. We have tried coating the nail heads with different kinds of oil, but without effect. We shall appreciate any information on how to get around this difficulty.

With the molds lying on the floor for two days you are faced with a factor that would not be present if you were casting every day. Hence, you will have to observe certain precautions that ordinarily would not be necessary. While the condensation of moisture primarily is responsible for the blow holes, steam is not the only factor to be considered. The moisture creates a thin film of iron oxide, or rust. In contact with the molten iron this rust explodes as a gas. Some of the gas escapes, but most of it becomes trapped by the iron which in a thin casting solidifies rapidly.

The only way to prevent this formation of oxide is to tin the nail heads or have them electroplated with a thin coating of copper or chromium. Instead of gating the castings on the bottom, they should be gated on top with a small pencil gate over each nail head. Before the mold is filled with metal the constant stream will evaporate any moisture and in addition will partly fuse the nail heads and form a solid joint. Naturally this type of gate will involve more expense, whether in green sand or in a small core, than the simple gate now in use, but it will insure good castings.

Birdseye view of Treasure Island, San Francisco bay site of the 1939 Golden Gate International exposition which will open Feb. 18. On the right is the east section of the San Francisco-Oakland Bay bridge, while beyond are the cities of Berkeley and Oakland

Methods Differ in Firing Cupola

We always have been accustomed to placing the entire coke bed in the cupola before lighting up; in fact that is the general practice in this section of the country. The authors of all published literature we have seen on this subject, advocate lighting one half the bed coke and after the flame breaks through on the top, adding the second half. We are under the impression that more coke would be required in the intermediate charges in this second plan on account of the lower part of the bed burning away. Do you think the iron picks up more sulphur from the whole bed method, than it would if we were to adopt the method where one half of the bed is allowed to burn through before the second amount of coke is added.

Provided the coke in the bed is at the proper height when it settles down, it is a case of six of one and half a dozen of the other, whether it is all dumped into the cupola in one lot at the beginning, or in two lots with a time interval between. One of the reasons for lighting the half bed first is to gain time. The half bed burns through more quickly than a whole bed.

Another reason is that the flame from the half bed dries the daubing above it before the second lot of coke is added. With a high whole bed the coke has a tendency to stick to the daubing and drag some of it down as the coke sinks. So far as the sulphur pickup is concerned we are inclined to the opinion that the amount will be the same whether the bed is made up as a unit, or in two parts. Iron does not begin to pick up sulphur until it is in a molten condition, and by that time the coke bed in the cupola is a unit irrespective of how it was made up in the first place.

Cores May Be Cause Of Bore Leakage

We are making cylinder block castings, and are having trouble with leakage in the bore. We are using 65 per cent pig iron and 35 per cent machinery and scrap iron. The castings are poured on top of the cylinder wall.

Leakage in the bores of your cylinder block castings may result from the cores lacking the proper permeability to carry off the gases generated when the molten metal strikes them, or from open, coarse grain structure in the iron. Since you do not state the composition of the pig iron, it is difficult to make any definite suggestions except to point out analyses employed for that work. Compare those with your present analysis and make adjustments in elements accordingly.

Several compositions are used and include: 2.00 to 2.20 per cent silicon, 3.25 to 3.40 per cent total carbon, 0.14 to 0.18 per cent phosphorus, 0.70 to 0.85 per cent manganese, 0.75 to 0.85 per cent nickel, and 0.25 to 0.35 per cent chromium. Silicon 1.80 to 2.00 per cent, 3.20 to 3.40 per cent total carbon, 0.16 to 0.20 per cent phosphorus, 0.70 to 0.90 per cent manganese, 0.15 to 0.20 per cent molybdenum, and 0.15 to 0.20 per cent chromium. A third composition contains 2.15 to 2.25 per cent silicon, 3.10 to 3.40 per cent total carbon, 0.12 to 0.18 per cent phosphorus, 0.50 to 0.70 per cent manganese, and 0.20 to 0.40 per cent chromium.

Gas and Steam Go Into the Metal

We are using a high permeability sand and venting it to the best of our knowledge, but we still have trouble with steam. We pour the metal at the lowest possible temperature. Do you think if we were to pour hotter metal we could eliminate the steam?

Steam may work its way and escape from a large, heavy casting where the metal is hot and lively, but it has little or no chance to escape from a thin casting where the metal solidifies almost instantly. In either case the molding method is at fault since in a perfect mold no steam enters the casting. Your problem is to prevent steam from entering the metal, rather than to find a method for eliminating the steam afterward.

Apparently the casting containing the blowholes differs in some respect from your general run of castings which presumably are made satisfactorily in the sand now in use. Without a knowledge of all the details, size and shape of casting, position in mold, type of flask, physical characteristics of the sand and method of ramming, we cannot offer any specific advice on the subject. Possibly the sand may be too wet, or rammed too hard. The bottom board may be too close or to tight. A close examination of these various features will furnish you a clue to the cause of the trouble.

Aluminum Sheet Is Not Easy to Cast

We have several pure aluminum castings to make, plain sheets 3/16-inch thick and 26 x 42 inches. The surface on both sides must be smooth and uniform. Several sheets have been cast in sand molds in the usual manner, but the surface is not acceptable. Apparently the only solution is to cast the metal under pressure in a metal mold.

Considering all the difficulties attached to the attempted production of these castings in sand molds, or under pressure in metal molds, the obvious solution to the problem would seem to be the substitution of rolled sheets. We have no comparable figures, but offhand we are inclined to the opinion that the rolled sheets not only would be more acceptable, but actually would cost less than the castings. Pure aluminum does not lend itself as readily as the alloyed material to casting either in sand or metal molds.

You do not state whether your attempts have been made in green sand or dry sand molds. We do not know of any instance exactly like yours, but if you already have not made the attempt, we suggest adoption of the technique employed in some ornamental bronze foundries. The mold is made in a stiff iron or steel flask and after it is dried it is turned up on edge for pouring. A thin gate all along the top edge is fed from a large pouring basin and of course the basin is filled as rapidly as is possible from the ladle to insure that metal fills the gate completely.

Aluminum Alloy for Patterns Shrinks

We make our own aluminum castings for patterns and matchplates, but quite often we get excessive shrinkage so that it is impossible for us to use the castings. Can you give us any information on the type of aluminum to use for that work, and what the proper pouring temperature should be?

While a number of different aluminum alloys are being employed by numerous firms engaged in pattern and matchplate manufacture, one of the leading patternmaking companies in the Middlewest has standardized on an alloy containing 92 per cent aluminum, 3 per cent silicon and 5 per cent copper. The alloy is made from virgin metals, and previous to use is cast into ingots. To prevent trouble from oxides and pinholes, the alloy is poured into the molds directly from the crucible in which it was melted eliminating any secondary transfer into ladles.

Before any machining operations are performed on the patterns or plates, the castings are normalized or aged for 6 hours at a temperature of 550 degrees Fahr. Pouring temperature of the alloy will depend upon the section thickness of the casting, its intricacy, size, etc. We suggest trying a pouring temperature of 1300 degrees Fahr., and observing the results obtained. Then the temperature can be increased or decreased as the case requires to insure a sound casting.

NICKEL CAST IRON FOR... STRENGTH

...IN HEAVY CASTINGS MADE BY AMERICAN SAW MILL MACHINERY CO.

For an ore sintering machine, American Saw Mill Machinery Co. cast this main drive gear with the following composition: T.C. 3.21, Si. 1.68, Ni. 1.29, and Mo. 0.36. 2" sections showed a tensile strength of 50,500 p. s. i.

This 12,500 lb. press head casting from the American Saw Mill Machinery Co. foundry is just out of the mold—hasn't been chipped or cleaned yet. It contains 1.25% Nickel and has a 55,590 p. s. i. tensile strength. Dense, uniform structure of this Nickel iron retains accurate dimensions despite high stresses and temperature changes.

Big castings, such as this 12-foot main drive gear or this 6-ton press head, are being produced of a Nickel alloyed cast iron possessing a minimum tensile strength of 50,000 p.s.i.

Such results are profitable—and practical through scientific use of Nickel and other alloying elements and by close control of all foundry operations.

These high strength shock and wear resisting Nickel cast irons are representative of the quality castings being produced by the American Saw Mill Machinery Co., Hackettstown, N. J. who also utilize a new molding procedure which guarantees extreme accuracy in the finished casting thereby avoiding excess weight.

Are you taking advantage of the strength of modern high test Nickel alloy cast iron in your equipment? Complete information will be furnished promptly without obligation. Please address:

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

J. E. Olson

Martin W. Pohlman

Frank M. Robbins

Albert Portevin

MEN of INDUSTRY

FRANK M. ROBBINS, president, Ross-Meehan Foundries, Chattanooga, Tenn., recently was elected president of the Steel Founders' society, Cleveland. Mr. Robbins was born in Hoosick Falls, N. Y. A graduate of Doane academy, he earned his bachelor of science degree at Denison university, Granville, O., and took a 2-year post graduate course in mining and metallurgy at the Colorado School of Mines. For a number of years he was a member of the engineering corps of the Pennsylvania and Baltimore & Ohio railroads. In 1911 Mr. Robbins started as engineer, Marion Malleable Iron works of the Chicago Railway Equipment Co., Marion, Ind., remaining with the company for 7 years, during which time he rose to the position of assistant superintendent and finally became secretary and sales manager. Meanwhile in 1913 he had been appointed vice president and general manager of Positive Rail Anchor Co., another subsidiary of Chicago Railway Equipment Co. In 1918 Mr. Robbins became assistant general manager, Ross-Meehan Foundries, later becoming vice president and more recently president of that company.

* * *

J. E. OLSON, recently was appointed general foreman of the gray iron foundry, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. Mr. Olson served a foundry apprenticeship at the Lake Erie Engineering Co., Buffalo and then worked in various parts of the United States and Canada as a journeyman molder. In 1910 he joined the Maryland Steel Co., Sparrows Point, Md., later taken over by the Bethlehem Steel Co., as a molder. A year later he was made foundry foreman. In 1917 he resigned to accept a position with the Bessemer Gas Engine Co., Grove City, Pa., as foundry superintendent and remained there until 1925 when he returned to the employ of the Bethlehem Steel Co. as superintendent of the iron and brass foundry and pattern shop at the Bethlehem Shipbuilding Corp., Moore plant, Elizabeth, N. J. In 1935 he was appointed foundry superintendent of Johnston & Jennings Co., Cleveland, and the following year was made foundry superintendent, Superior Diesel Engine division of National Supply Co., Springfield, O.

* * *

MARTIN W. POHLMAN, vice president, J. W. Pohlman Foundry Co., Buffalo, is chairman of the Buffalo chapter of the A.F.A. Mr. Pohlman was born in Buffalo in 1896 and was educated at Masten Park high school, Buffalo. Following graduation, he became connected with the J. W. Pohlman Foundry Co. where he served a 4-year apprenticeship. In 1919 he was made foreman, and since 1925 has been vice president and superintendent. He is a member of the American Foundrymen's association, National Founders' association, Gray Iron Founders' society.

* * *

ALBERT PORTEVIN, distinguished French physical metallurgist, has been made an honorary member of the American Institute of Mining and Metallurgical Engineers. Prof. Portevin was born in Paris, France, in 1880, and at the age of 19 entered the Ecole Centrale des Arts et Manufactures. After graduation he was consulting engineer at the Credit Lyonnais, and later was connected with the Usines Metallurgiques de la Bonneville. From 1905 to 1913 he supervised the chemical laboratories of the de Dion Bouton automobile works. He volunteered during the World war, and later was inspector of war materiel. He is a professor at the Ecole Centrale des Arts et Manufactures, at Ecole Superieure de Fonderie, and at the Ecole Superieure de Soudre Autogene. Prof. Portevin has done a large amount of work on steels and their heat treatment, alloys and their properties and structure, pig irons, and foundry practice. He is the author of over 200 papers, and member of numerous societies, including the Association Technique de Fonderie de France, and the International Committee on Cast Iron Testing. He also is a chevalier of the Legion of Honor, and just has been elected honorary president of the Association Technique Fonderie de France.

* * *

FRANK H. BONNET, vice president, Buckeye Steel Casting Co., Columbus, O., has been elected a member of the board of directors of that company.

* * *

H. T. ODENKIRK, for the past 3 years connected with the Keen Foundry Co., Griffith, Ind., has been appointed sales manager.

* * *

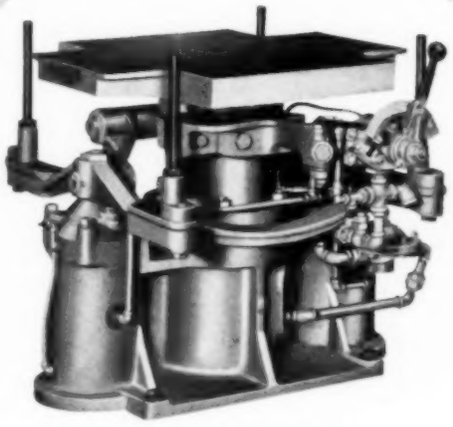
ARMAND T. CHANDONNET has been named treasurer and general manager, Elmira Foundry Co., Elmira, N. Y., subsidiary, General Electric Co., to succeed JAMES D. MCCANN, retired. Mr. Chandonnet formerly was assistant manager.

* * *

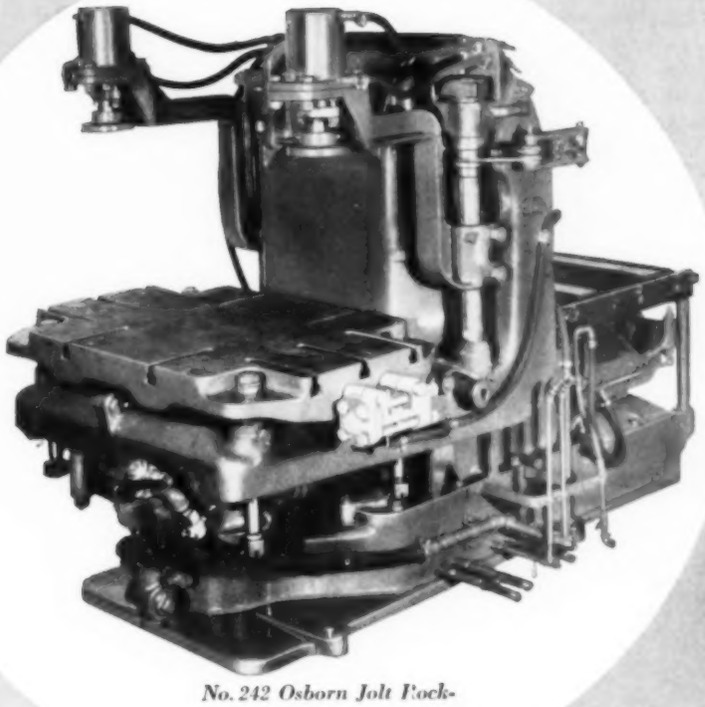
JAMES H. CRITCHETT and FRANCIS B. MORGAN have been elected vice-presidents of the Electro Metallurg-

(*Continued on page* 40)

TEAM-MATES
Flexible and Fast



No. 559HD (Heavy Duty) Osborn Jolt Stripper Machine for Cope Moulds



No. 242 Osborn Jolt Rock-over Pattern Draw Machine for Drag Moulds

FOR JOBBING AND SEMI-PRODUCTION FOUNDRIES

● Flexible in respect to their quick adaptability to changing jobs, the two machines illustrated make an excellent pair for jobbing and semi-production work.

Drag moulds are produced on the No. 242; Cope moulds on the No. 559HD. Both machines are equally fast, accurate, easy to operate and engineered for long, dependable service.

Operating features of these machines are right up-to-date. Every provision is made to assist the moulders in obtaining the highest standards of production.

Complete details about these machines will be furnished immediately upon request. INVESTIGATE!

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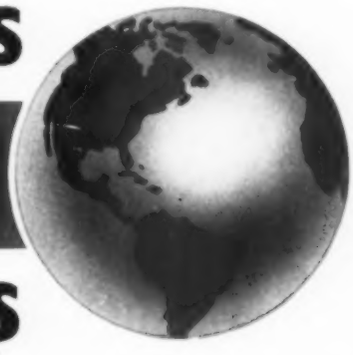


MOULDING MACHINES

(*Continued from page* 38)

ical Co., a unit of Union Carbide & Carbon Corp., New York. Mr. Critchett has been in charge of research work, and Mr. Morgan has been works manager for this company.

* * *

LOUIS RASMUSSEN, formerly foundry manager, Nash Kelvinator Co., Kenosha, Wis., has been made manager of the foundry, Indianapolis works, International Harvester Co.

* * *

HERBERT S. SIMPSON, president, National Engineering Co., Chicago, recently was installed as president of the Chicago Kiwanis club for a 1 year term.

* * *

E. W. SEEGER, formerly assistant chief engineer, Cutler-Hammer Inc., Milwaukee, recently has been made chief engineer; also, P. B. HARWOOD, formerly general engineering supervisor, has been appointed assistant chief engineer.

* * *

NEIL C. HURLEY JR., formerly secretary, Independent Pneumatic Tool Co., Chicago, recently was elected vice president of the company at a special meeting of the board of directors. Mr. Hurley joined the company in 1932 after graduating from the University of Notre Dame and has been active in the direction of sales for the company's electric tool division.

* * *

BERTRAM G. PARKER, president, Youngstown Foundry & Machine Co., Youngstown, O., recently was elected president of the Youngstown Chamber of Commerce. Mr. Parker has been active in association work and is past chairman and a member of the board of directors of the Northeastern Ohio chapter of A. F. A.

* * *

CHARLES W. PEARSON, vice president and sales manager, Buffalo Foundry & Machine Co., Buffalo, has been promoted to executive vice president and general manager. He entered the employ of the firm in 1905 as assistant bookkeper, and for 33 years has been engaged in executive capacities in various departments. He also is a director of the company.

* * *

ROBERT RONCERAY and ERNEST FERON have been appointed joint managing directors of Societe Anonyme des Etablissements Ph. Bonvillain et E. Ronceray, Choisy-le-Roi, near Paris, France. Mr. Ronceray's duties will be connected more especially with the technical phases of the business while Mr. Feron will deal with the commercial side. M. PEGARD is chairman of the firm.

J. M. Franklin

Recently made manager, Central Foundry Co., Holt, Ala., as announced in the January issue

* * *

CHARLES E. BRINLEY has been elected president, Baldwin Locomotive Works, succeeding George H. Houston, who resigned last August. Mr. Brinley is a director and member of the executive committee of the company and since the resignation of Mr. Houston has been an acting vice president with full executive powers. William H. Harman has been elected vice president in charge of sales. Resignation of Robert S. Binkerd as vice president and director of sales was accepted by the board.

Mr. Brinley recently was elected a member of the board of directors and executive committee, General Steel Castings Corp., Eddystone, Pa.

* * *

FRED K. FRAZER recently was elected president, Frazer & Jones Co., Syracuse, N. Y., at a special meeting of the board of directors of the company. Mrs. Mary B. Frazer was elected secretary of the organization and Martin W. Henley was re-elected vice president.

Mr. Frazer was born in Syracuse, June 16, 1885, and received his early education in the public schools of that city. Later he attended Rockland Military academy at Nyack, on the Hudson, N. Y., and was graduated in 1902. In 1906 he entered the employe of Frazer & Jones Co. which was founded by his grandfather Kasson Frazer in 1845. For a number of years Mr. Frazer has been secretary and treasurer of the company.

* * *

THOMAS DREVER, formerly secretary-treasurer of American Steel Foundries, Chicago, recently was elected president to succeed the late George E. Scott. Mr. Drever, who is a certified public accountant, started to work in 1905 with Price Waterhouse Co., accountants. In 1907 he became comptroller, United States Coal & Oil Co. and American Zinc Lead & Smelting Co. of Boston, becoming connected with American Steel Foundries in 1910. In 1924 Mr. Drever was elected president, Wahl Co., returning to American Steel Foundries as secretary-treasurer and director in 1929.

Coinciding with Mr. Drever's promotion, OLIVER E. MOUNT, secretary and assistant treasurer of American Steel Foundries since 1932, was

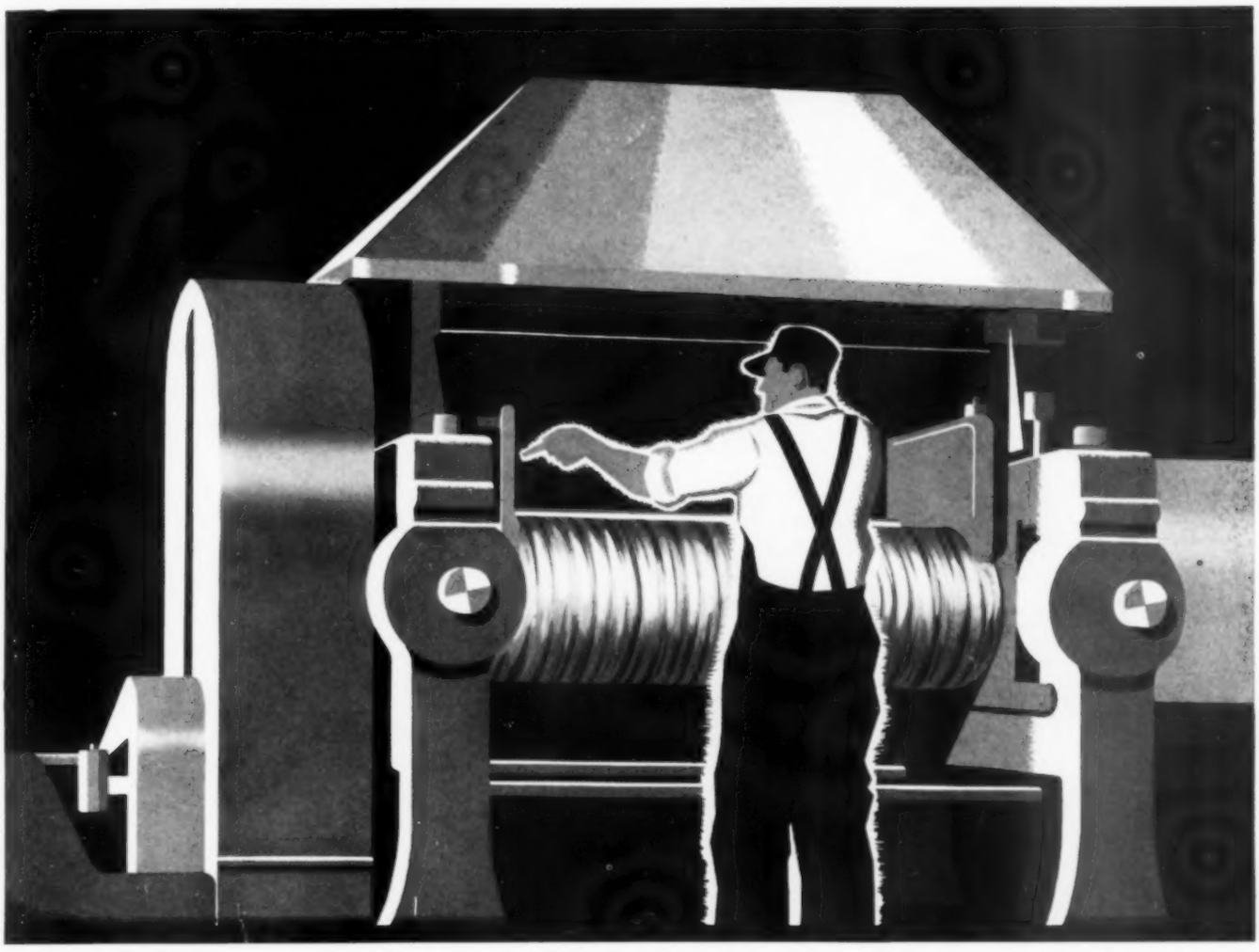
(*Concluded on page* 42)

Herbert S. Simpson

Louis Rasmussen

Bertram G. Parker

Thomas Drever



CAST IRON AND CONFIDENCE

A Molybdenum addition to cast iron has often proved the best way to get the most out of money spent to improve materials.

The selection of a gray cast iron with 0.75% Moly for 64-inch rubber mill drives is a typical example. The Moly iron is strong (a test showed 61,000 p.s.i.) and tough enough to stand severe service. Despite the necessary hardness, machining presents no difficulties. Thus full advantage is taken of the economy of cast iron, without sacrifice of performance capacity.

This is only one of the many cases in which Molybdenum iron has brought about a combination of economy with dependability. Investigation may show that you can apply it with advantage. Our technical book, "Molybdenum in Cast Iron," is free to interested production executives and engineers on request.

PRODUCERS OF FERRO-MOLYBDENUM, CALCIUM MOLYBDATE AND MOLYBDENUM TRIOXIDE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

(*Concluded from page* 40)

elected treasurer to succeed Mr. Drever, also continuing as secretary. Mr. Mount entered the employ of the company as cashier at the Chester, Pa., plant in 1916.

* * *

M. W. ZEMAN, formerly sales manager of the machine division, Osborn Mfg. Co., Cleveland, has been appointed director of sales, engineering, and research and RUSSELL F. LINCOLN, formerly assistant sales manager of the machine division, has been made sales manager.

After completing high school education, Mr. Zeman began his business career with the Dean Electric Co., Elyria, where he remained for 5½ years. He then joined the American Multigraph Co., Cleveland, as

M. W. Zeman

draftsman. During this time Mr. Zeman completed course in mechanical and electrical engineering and also devoted 2 years of evening study to practical pattern making and machine shop practice. Following a connection with the International Store Service Co. in the designing department. Mr. Zeman joined the Osborn Mfg. Co. in 1912 as a designer in the molding machine division.

For a short time he had charge of engineering and manufacturing and in 1914 began sales work. In 1919 he was made director of European sales and spent the next few years abroad working under tremendous odds in introducing molding machines in France, Belgium, Switzerland, Italy, Spain and England. In 1923, Mr. Zeman was made sales manager of the machine division, having direction of molding machine sales in both United States and abroad.

Mr. Lincoln was born in Quincy, Mass., in 1891 and was educated in the public schools of Cleveland. He then entered the employ of the Winchester Repeating Arms Co., New Haven, Conn., where he spent 12 years, thus gaining knowledge of that subject which qualified him as an expert in the handling of arms and ammunition in connection with aircraft armament, and enabled him to serve as a lieutenant in the air service during the World war.

Entering the foundry field, he immediately became a student of Prof. H. M. Boylston, Case School of Applied Science, Cleveland, and completed the special course in metallography and metallurgy of iron and steel given at Cleveland college. Mr. Lincoln joined the Osborn Mfg. Co. in the machine division in 1922, and has been actively engaged in sales work becoming assistant sales manager in 1933. He has been active in association work and is treasurer of the Northeastern Ohio chapter of the American Foundrymen's association.

* * *

ALLAN E. ASHCRAFT has been appointed vice president in charge of operations in the following plants of Fairbanks, Morse & Co.: Beloit, Wis., Three Rivers, Mich., St. Johns, Vt., San Francisco, Moline, Ill., and Stuttgart, Ark. His headquarters will be at 600 South Michigan avenue, Chicago.

Bill Celebrates

(*Concluded from page* 27)

Harry Richey to introduce many new ideas to the foundry industry, such as whistles, bells, awnings and castors on cupolas. Originals of the Bill drawings may be found on the walls of foundry offices throughout the world.

In saluting Bill on this anniversary, the colleagues of Pat Dwyer and Harry Richey pay tribute to a magnificent job perfectly done.

Makes Appointments

Norton Co., Worcester, Mass., has made several personnel changes. G. A. Park formerly assistant sales manager has been appointed eastern sales manager in charge of the territory east of and including the Pittsburgh district. R. M. Johnson, formerly sales engineer, has been appointed western sales manager and will have charge of the Cleveland, Detroit and Chicago warehouses and other western territories. A. G. Green, research laboratories, has been made sales engineer. W. R. Moore has been appointed general sales manager and W. T. Montague has been appointed assistant vice president.

Book Review

Foundry Work, by William C. Stimpson, and Burton L. Gray, revised by John Grennan; cloth; 216 pages 5 x 8 inches; published by the American Technical Society, Chicago; supplied through THE FOUNDRY for $2.00 and in Europe by the Penton Publishing Co., London.

This volume, one of a rather extensive series of handbooks, is designed as a practical handbook on standard foundry practice including hand and machine molding, casting operations, melting and pouring equipment, metallurgy of metals and related features. Cognizance is taken of the fact that casting methods have partaken of general mechanical development of recent years. While the basic principles of casting manufacture have not changed, all the newer developments are presented.

Discussion on molding practice is illustrated by a number of typical

Russell F. Lincoln

molding problems and by a description of the many types of molding machines. Subjects covered in greater or lesser detail include: Molding practice, molding equipment, molding processes, typical molding problems, molding machines, pattern mounts, open sand molding, loam molding, coremaking, casting operations, foundry materials, sand and refractories, fuels, sand handling and conditioning equipment, continuous pouring, melting equipment, metal handling equipment, handling and cleaning castings, copper alloys, aluminum alloys, magnesium alloys, bearing alloys, zinc base casting metals, testing cast metals, classification and specifications for gray iron castings, steel casting specifications, alloy cast steel specifications, mixing metals, heat treatment.

William C. Stimpson formerly was head instructor in foundry work and forging, Pratt institute, Brooklyn, N. Y., and Burton L. Gray, instructor in foundry practice, Worcester Polytechnic institute, Worcester, Mass. John Grennan is instructor in shop practice, University of Michigan, Ann Arbor, Mich.

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ABRASIVE CLEANING DUST CONTROL

Because of its ease of installation, its constant performance under all operating conditions, *uniform air delivery, while handling the heaviest dust loads*, low operating cost and adaptability to available space without disturbing normal foundry operations, Roto-Clone has set new high standards of economy in foundry dust control. Send for literature describing its application to shake out, sand handling, screens, mullers, tumbling mills, sand blast, grinders, etc. Ask for Bulletin No. 276.

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ACTIVITIES OF FOUNDRY GROUPS

Pittsburgh

ABOUT 600 members and guests of the Pittsburgh Foundrymen's association gathered in Hotel William Penn in Pittsburgh, Dec. 19 for the annual Christmas party. The entertainment committee under the chairmanship of N. J. Kelly, Kelly Foundry Co., provided a turkey dinner complete from soup to nuts. Noisemakers and other favors were supplied. Music was by Danny Nirella's orchestra. An all-girl floor show, produced by Peg Lanagan, was introduced by J. M. Stewart, Hickman-Williams & Co., and featured in addition to the girls H. P. Spilker, chairman of the executive committee. Group singing was a feature of the evening. In addition to Messrs. Kelly and Stewart, the entertainment committee includes E. C. Buerkle, National Bearing Metal Co.; Peter Soffel, Pittsburgh Metal Purifying Co.; C. N. Arnold, Lewis Foundry & Machine Co.; T. H. Pattison, Mackintosh-Hemphill Co.; Irving Niedringhaus, Mesta Machine Co.; D. E. MacLean, Lava Crucible Co.; Geo. R. Crowl, J. S. McKesson; James Durkin, Fort Pitt Malleable Iron Co.; Stewart B. Scott, Pittsburgh Coke & Iron Co.; H. M. Wolfarth, Sterrit-Thomas Fdry. Co.; all of Pittsburgh, and J. S. Coxey Jr., Industrial Silica Corp., Youngstown, O.

Regular January meeting of the Pittsburgh Foundrymen's association was held at Fort Pitt Hotel's English room here Monday, Jan. 16. About 75 foundrymen and guests were on hand to hear Dr. Richard Schneidewind, department of metallurgical engineering, University of Michigan, speak on "Effects of Chemical Composition and Casting Practice on Gray Irons."

In his talk, Dr. Schneidewind outlined the results of work in research at the University of Michigan and the applications of gray iron to commercial purposes. He also discussed the influence of basic composition, carbon and silicon on the physical properties of gray cast iron, as well as the influence of ladle treatment, alloying and melting technique on these properties. The speaker illustrated his points with numerous slides and charts.

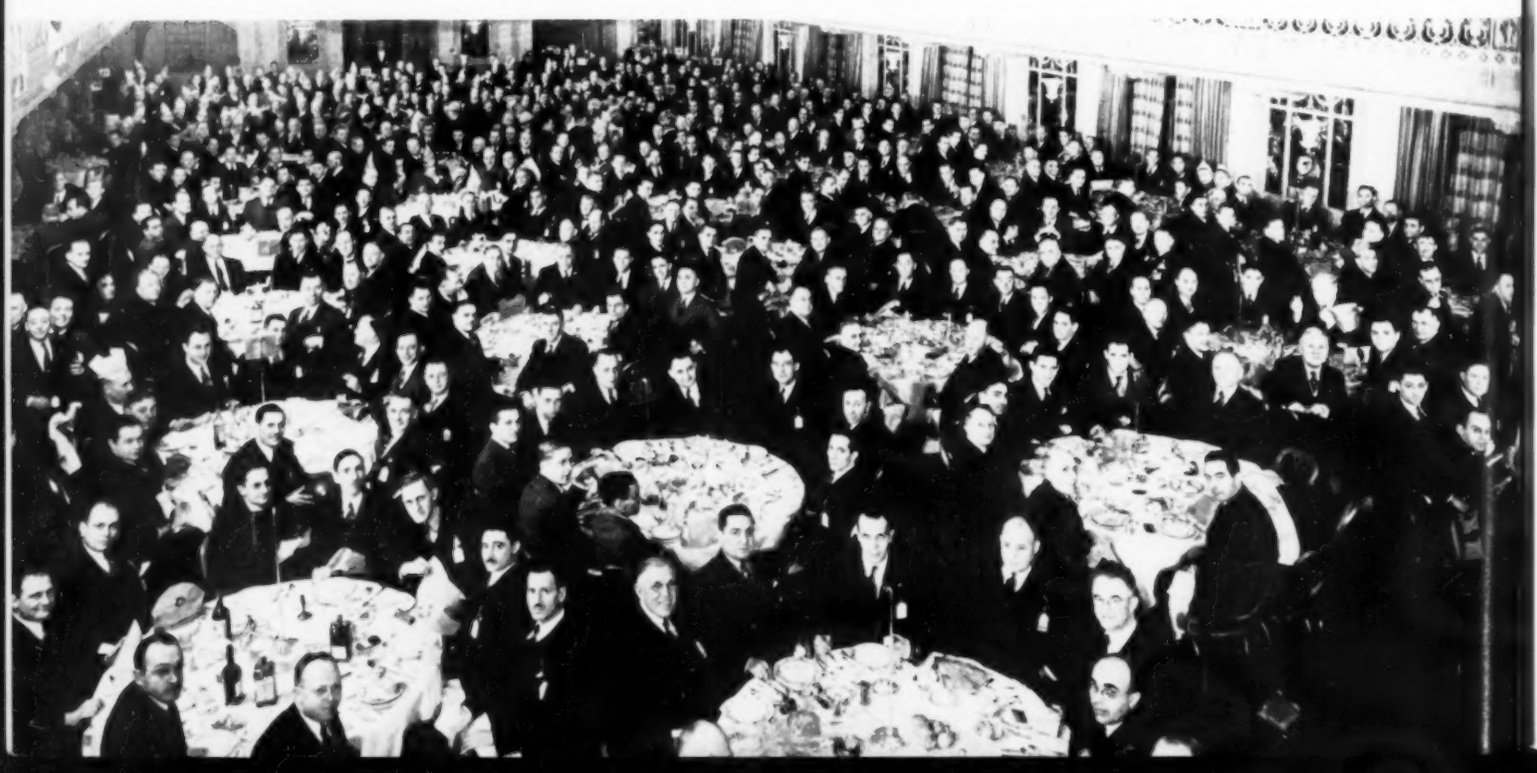
Otto Nadolny, president, Pittsburgh Foundrymen's association, acted as chairman and the discussion was led by F. R. Elliott, Trafford Foundry, Westinghouse Electric & Manufacturing Co., Trafford, Pa.—*R. L. Hartford.*

Central New York

ON JAN. 10 a group of foundrymen in central New York met in Syracuse and organized the Central New York Chapter of the A. F. A. The group elected a nominating committee, and laid plans for the first meeting to be held on Feb. 10 at 6:30 p.m. in the Onondaga hotel, Syracuse. The nominating committee has proposed the following slate of officers for elec-

(*Continued on page* 47)

Members and guests of the Pittsburgh association had an enjoyable time at the annual Christmas party



(*Continued from page* 44)

tion at that meeting: Chairman, H. H. Judson, foundry superintendent, Goulds Pumps Inc., Seneca Falls, N. Y.; vice chairman and chairman program committee, F. C. Wheeler, owner, Kimman & Wheeler, Syracuse, N. Y.; secretary, L. D. Wright, foundry superintendent, U. S. Radiator Corp., Geneva, N. Y., and treasurer, I. L. Jones, treasurer, International Heater Co., Utica, N. Y.

Board of directors for 1 year—Prof. A. C. Davis, Cornell university, Ithaca, N. Y., and L. E. Hall, Syracuse Chilled Plow Co., Syracuse, N. Y.; for 2 years—Leo Lonergan, Morris Machine Works, Baldwinsville, N. Y., and G. M. Thrasher, R. Lavin & Sons, Elmira, N. Y., and for 3 years—E. J. Bair, Utica Radiator Corp., Utica, N. Y., and F. F. Shortsleeve, Elmira, N. Y. Technical program of the evening will be a talk by Robert Glass, Republic Steel Corp., Buffalo, on the "Making and Application of Pig Iron."—*H. H. Judson.*

Chicago

JANUARY meeting of the Chicago chapter of A. F. A., had as featured speaker Stuart Wells Utley, president, Detroit Steel Castings Co., who discussed "Why I Believe in the Free Enterprise System." His talk pointed out the definite advantages this country holds over certain foreign nations. It was emphasized that the citizen here has more liberty and freedom than anyone else but some of our basic principles of government are being lost gradually because of present economic policies.

Statistics presented by Mr. Utley brought out the facts that this country, with but 6.2 per cent of the world's population and but 5.7 per cent of its area, in 1929 possessed one-third of the world's wealth and 43 per cent of the world's annual income.

Figures for 1934 show the United States with 32 per cent of the world's railroad mileage, 58 per cent of all telephones, 44 per cent of all radio receivers, 76 per cent of the world's automobiles and 36 per cent of its developed water power. In this same year, according to Mr. Utley, our country produced 62 per cent of the world's petroleum, 37 per cent of its steel, 35 per cent of its copper, 34 per cent of its pig iron, 32 per cent of its coal, 52 per cent of its corn and 62 per cent of its cotton. At present the United States is estimated to possess nearly one-half of the world's monetary metal and has two-thirds of the world's banking resources.

Purchasing power of the United States population, Mr. Utley stated, is greater than that of the half billion people in Europe and considerably greater than that of the billion people in Asia. Because of these accomplishments even in the face of depression, surprise is to be expressed that certain groups or individuals would wish to replace the form of government that helped to make these accomplishments.

It is Mr. Utley's belief that America's accomplishments are due to the fact that the individual here enjoys a greater freedom than in any other nation on earth. Yet, he states, enemies of the free enterprise system are working to bring about changes.

On Jan. 16 the first lecture in the lecture course series was held at Peoples Gas building auditorium, Chicago. "Melting of Raw Materials" was the subject presented by John Tissing, vice president and secretary, Charles C. Kawin Co., Chicago. Mr. Tissing discussed the manufacture and application of coke, pig iron, scrap, refractories, fluxes, alloys and other materials. Technical chairman was G. P. Phillips, metallurgist, tractor works, International Harvester Co.

The second lecture will be held Feb. 6 when Martin Lefler, Oliver Farm Equipment Co., South Bend, Ind., will discuss "Molding of Raw Materials." Technical chairman will be Harold W. Johnson, foundry engineer and superintendent, Northwestern Foundry Co., Chicago.—*J. F. Powell.*

Quad City

OVER 125 members and guests were present at the regular meeting of the Quad-City chapter of A. F. A. held Jan. 16 at the LeClaire hotel, Moline, Ill., Chairman M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill., presided. Jean Pope, insurance, Moline, presented the coffee talk regarding a fishing trip in the West. Fred J. Walls, International Nickel Co., Detroit, presented the main talk on "Significant Trends in the Foundry Industry."

Mr. Walls told of distribution of foundries throughout the country, and results of a survey, made as to the number, show they are becoming centralized to areas closer to the districts in which castings are used. Many trends were given in regard to various operations such as gating, heat treating castings, cupola practice, and use of electric furnaces, reports for analysis, and various analyses themselves. Equipment improvements and advances toward more mechanical foundries were mentioned, as was greater use of permanent molds in many fields of making castings. Mr. Walls showed an excellent group of slides on the various topics regarding trends in the foundry industry. Many questions of both practical and technical nature were asked by the group.

February meeting of the chapter will be a joint meeting with the American Society for Metals at Fort Armstrong hotel, Rock Island, Ill., Feb. 20. F. F. Vaughn, assistant chief metallurgist, Caterpillar Tractor Co., Peoria, will speak on "Heat Treatment of Cast Iron and Steel."—*J. Morgan Johnson, secretary-treasurer.*

Michigan-Indiana

FIFTEENTH chapter of the A. F. A. was organized at a meeting held Jan. 18 at the Oliver hotel, South Bend, Ind. About 150 foundrymen from Northern Indiana and Southern Michigan were present, representing such cities as Michigan City, Benton Harbor, Buchanan, Kalamazoo and St. Joseph, Michigan, and South Bend, Elkhart, Terre Haute, Mishawaka, Plymouth and LaPorte, Indiana.

Martin J. Lefler, general foundry superintendent, Oliver Farm Equipment Co., South Bend, and chairman of the meeting called upon Robert E. Kennedy, secretary of the A. F. A. who reported that the A. F. A. board had acted favorably on the petition for a chapter which will be called the Michigan-Indiana chapter. Report of the nominating committee was presented by its chairman, Joseph Drain, and proposed the following nominations: Chairman, Martin J. Lefler; vice chairman, B. J. Voll, Sibley Foundry & Machine Co., South Bend; secretary-treasurer, L. L. Andrus, American Foundry Equipment Co., Mishawaka, Ind.

For board of directors—R. J. McSherry, Studebaker Corp., South Bend; M. F. Doty, Clark Equipment Co., Buchanan, Mich.; W. A. Bachman, New York Central Railroad Co., Elkhart, Ind.; A. C. Arbogast, Northern Indiana Brass Co., Elkhart, Ind.; O. A. Pfaff, American Foundry Equipment Co., Mishawaka, Ind.; A. J. Rumely, LaPorte Foundry Co., LaPorte, Ind.; W. A. Schlosser, Argos Foundry Co., Plymouth, Ind.; George E. Stoll, Bendix Aviation Corp., South Bend; W. R. Gilmore, Superior Steel & Malleable Castings Co., Benton Harbor, Mich.; H. Klouman, Michiana Products Corp., Michigan City, Ind., and Prof. E. G. Mahin, University of Notre Dame, Notre Dame, Ind.

No further nominations being presented, those named were declared elected. Chairman Lefler then announced that necessary committees to complete the chapter organization would be appointed later. He called upon H. W. Dietert, Harry W. Dietert Co., Detroit, who presented at extremely able and interesting review of foundry sand control methods and problems. His talk was followed by an extremely lively

discussion. In closing the meeting Chairman Lefler announced that the next meeting of the chapter will be held Feb. 10. Marshall Post, Birdsboro Foundry & Machine Co., Birdsboro, Pa., and president of the A. F. A. will be the speaker.

St. Louis

A LARGE group of foundrymen and friends attended the January meeting of the St. Louis District chapter of A.F.A. held on Jan. 12 at the York hotel. In the continued absence of J. O. Klein, chairman, Lee Everett, vice chairman, presided. Immediately following the dinner Clarence Chase, St. Louis attorney, gave an interesting discussion of the wage and hour act.

Following a brief intermission the business session of the evening was opened by Vice Chairman Everett and the usual reports of the secretary, treasurer were given. Webb Krammerer, chairman of the program committee then directed attention to the February meeting in which Marshall Post, national president, will speak. In addition to Mr. Post there will be a coffee talk by J. Roy Stockton, of the sports staff, *St. Louis Post Dispatch*, who will give a talk on the possibilities of the St. Louis Cardinals and the St. Louis Browns during 1939.

Membership committee report was presented by R. Stiefel, and C. R. Culling gave a report of the apprentice training committee directing special emphasis to the coming 1939 Cincinnati convention. He urged that all interested in the apprentice training contest notify the committee.

Report of the Rolla conference committee was presented by Louis Desparois indicating that preparations were already under way toward securing of a fine program for our annual Fall conference at the Missouri School of Mines and Metallurgy at Rolla, Mo. Doc. Burt then introduced the speaker of the evening, J. R. Hewitt, American Manganese Steel Corp. who, in addition to a very fine talk outlining progress of radiography, presented some excellent slides indicating the use of x-ray work in castings. Keen interest was displayed by the entire group in these slides and the talk as well as the round table conference that followed.—*J. W. Kelin, secretary treasurer.*

New Jersey

ABOUT 120 foundrymen attended the regular meeting of the New Jersey Foundrymen's association on Jan. 10 at the Downtown club, Newark, N. J. W. J. Maton, foundry superintendent, Waterbury Farrell Foundry & Machine Co., Waterbury, Conn., spoke on "A Practical Foundryman's Experience on General Jobbing Work."

Mr. Maton described using two cupolas, 25 inches and 54 inches, the small one being handy for special mixtures. Both cupolas are equipped with built in forehearth and a covered channel from the cupola. For the 54-inch cupola, the forehearth has a capacity of 8 tons, iron flowing continuously into the forehearth and all tapping being done at that spout. This forehearth cuts carbon about 20 points. A blast volume ammeter is calibrated to show cubic feet per minute and the volume is held constant at 6200 cubic feet. Mr. Maton uses a 36-inch bed in the 54-inch cupola but believes that all foundries should find the best height bed and blast volume by experiment rather than by theory.

The 54-inch cupola has not been relined in 1½ years and he attributes this to the patching material which is a 3 to 1 mixture of amorphous silica stone and good clay. The speaker advised that on deep holes, instead of filling them all at once, to patch with a layer not over 1-inch thick, continuing daily until the hole is filled.

All heavy castings are made on a sandslinger and all in dry sand. The sand handling system includes a 50-ton storage tank for old sand, a 100-ton tank for prepared sand, and a 15-ton tank to feed sand to the sandslinger through a chute. The cleaning room, 135 x 80 feet is separated from the foundry and uses hydraulic cleaning which has cut labor cost considerably and eliminates dust.

Following Mr. Maton's talk, two local foundrymen—H. L. Edinger, vice president, Barnett Foundry & Machine Co., and A. P. Grimm, president, Grimm Foundry Co.—gave short prepared talks on their experience with alloys. An active general discussion followed and great interest was shown in the use of copper.

The next meeting of the association is on Feb. 13, Gottfrid Olsen, foundry engineer, National Founders' association, Chicago speaking on "Making Good Cupola Iron without Alloys."—*John L. Carter, secretary.*

New England

ANNUAL meeting of the New England Foundrymen's association was held at the Engineers' club, Boston, on Jan. 11. This was the forty-third anniversary of the organization and about 200 members and guests were in attendance. After the dinner, President Henry A. Jensen greeted the members and guests and after wishing everyone a happy and prosperous New Year, called upon A. S. Wright, Hunt-Spiller Mfg. Corp., chairman of the nominating committee, who read the names of the following members who had been nominated as officers for the ensuing year:

President, Robert J. Nelson, Arcade Malleable Iron Co., Worcester, Mass.; vice president, Francis LeBaron, E. L. LeBaron Foundry Co., Brockton, Mass.; treasurer, Arthur W. Gibby, East Boston, Mass., and secretary, Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass.

Nomination for the executive committee included Charles Butler, Warren Pipe Co. of Mass. Inc., Everett, Mass.; Raymond Meader, Whitin

(*Continued on page* 50)

Good fellowship and good cheer reigned supreme at the Pittsburgh Christmas party. Illustrations courtesy of Sterling Farmer, Sand Products Corp., Cleveland

DEPENDABILITY

THE SUPERIOR CHARCOAL IRON COMPANY ranks today, as it has since 1898, the most dependable source of supply for Pure Lake Superior Charcoal Pig Iron.

Today, as always, our entire efforts have been concentrated on the production and marketing of one product: PURE CHARCOAL PIG IRON. During the life of this pioneer Company, our policy has been to maintain careful blast furnace practice coupled with the use of only the highest grade of uniform ore, pure CHARCOAL for fuel and a little fluxing stone in the furnace burden.

THE 16 GRADES

available in the "ANTRIM" and "NEWBERRY" Brands (each grade within very narrow analysis limits) enable foundrymen to meet the most exacting specifications.

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Superior Charcoal Pig Iron

SUPERIOR CHARCOAL IRON COMPANY

GRAND RAPIDS MICHIGAN

(*Continued from page* 48)

Machine Co., Whitinsville, Mass.; Augustus W. Calder, New England Butt Co., Providence, R. I.; Justin A. Duncan, William Duncan Co., East Boston, Mass., and Charles A. Reed, Rogers-Brown-Lavino Co., Cambridge, Mass.

Officers were voted upon and the complete slate selected was elected as read by Chairman Wright. President Jensen then turned the meeting over to the Chairman of the Committee on Arrangements, Charles A. Reed. The entire program was one of entertainment and the committee had procured an elaborate program of fine talent for the occasion.—*M. A. Hosmer.*

Northeastern Ohio

NATIONAL officers night meeting Jan. 12 in the Cleveland club, Cleveland, attended by approximately 160 members was featured by an exceptionally illuminating and practical talk by M. J. Gregory, manager of the foundry division Caterpillar Tractor Co., Peoria, Ill., under the title: "Problems, Applications and Production of Gray Iron Castings." With slides, castings and cores he described the methods, equipment and materials employed in the production of castings for diesel and gasoline engines for a wide range of industrial applications. Castings complete and in section were set up on a long table and attracted a great deal of interested attention before and after the meeting.

Illness prevented the attendance of Marshall Post, president of the A.F.A., at the meeting. His place was taken by Henry S. Washburn, vice president of the association and president The Plainfield Castings Co., Plainfield, Conn. The national office, Chicago was represented by C. E. Hoyt, executive vice president, E. O. Jones, treasurer and director of Safety and Hygiene section, also by directors J. L. Wick, Jr., past president of the association and president of Falcon Bronze Co., Youngstown, O., and H. S. Hersey, vice president general manager C. O. Bartlett & Snow Co., Cleveland. Out of town visitors included Vaughan Reid, president City Pattern Works, Detroit; Fred J. Walls, International Nickel Co., Detroit; Victor Hydar, Milwaukee, recently appointed senior field representative to work with the Federal committee on apprenticeship; C. E. Westover, vice chairman of the Chicago chapter A.F.A. and superintendent Burnside Steel Foundry Co., Chicago.

A brief synopsis imposed by space limitations cannot do justice to Mr. Gregory's spendid presentation. Full text of the address with which he has favored several foundry conferences during the past year, appeared in two sections in the June and July, 1938, issues of THE FOUNDRY. Impromptu interpolations added greatly to the spoken presentation and the ready manner in which he answered a barrage of questions from the floor afterward indicated a comprehensive knowledge of and familiarity with the subject.

Foundry Equipment Manufacturers' night will be held Feb. 9, with the following speakers: Russell F. Lincoln, Osborn Mfg. Co., Cleveland; L. D. Reed, Whiting Corp., Harvey, Ill.; H. L. McKinnon, C. O. Bartlett & Snow Co., Cleveland; C. A. Barnett, Foundry Equipment Co., Cleveland; Leon F. Miller, Osborn Mfg. Co., Cleveland; Frank Pedrotty, American Foundry Equipment Co., Mishawaka, Ind.; F. A. Ebeling, W. W. Sly Mfg. Co., Cleveland.—*Pat Dwyer.*

New York-New Jersey

THE subject, "Foundry Practice" was ably discussed by H. H. Judson, foundry superintendent, Goulds Pumps Inc., Seneca Falls, N. Y., at the regular meeting of the Metropolitan N. Y.-N. J. chapter of A. F. A., held at the Essex House, Newark, N. J., Monday evening, Jan. 9, with about 50 members and guests present.

Introduced by Don Reese, International Nickel Co., and chairman of the chapter, as being unique in his practice of using two cupolas for duplexing, Mr. Judson immediately entered into a detailed description of the process used in his plant for producing heavy sectioned pump castings. An 87 per cent steel charge is brought down in a continuously tapped 54-inch cupola as a low carbon iron, containing approximately 2.15 per cent total carbon. In another cupola a high carbon, high silicon iron is melted. The two irons are mixed in such proportions as to produce an iron of about 2.50 per cent total carbon and 1.50 per cent silicon, this composition being suitable for sections down to 1½ inches. Pouring metal immediately after mixing is essential, the speaker pointed out, to take advantage of the inoculating effect of the soft iron addition. Allowing duplexed metal to stand for 15 to 20 minutes before pouring produces a markedly weaker iron.

This process, which has been in use for 12 years, resulted from a search for a method which would produce consistently pressure tight castings possessing strengths of 50,000 pounds per square inch in heavy sections. Ordinary cupola iron produced the desired strength but too often did not possess the required pressure tightness in heavy sections. However, regular cupola iron is being used for lighter section castings wherein it is entirely satisfactory. As an aid to securing dense castings, Mr. Judson advocated use of high pouring temperatures and hard rammed molds. A spontaneous discussion followed the well received talk.—*K. A. DeLonge.*

N. Ill. and S. Wis.

FIFTY members and guests attended the regular meeting of the Northern Illinois-Southern Wisconsin chapter of A. F. A. on Jan. 13 at Hotel Nelson, Rockford, Ill. John Clausen, Greenlee Bros. & Co., Rockford, and chairman of the chapter presided at the meeting at which M. A. Scott, Greenlee Foundry Co., Chicago, spoke on "Production of Uniform and Dense Structures in High Test and Alloy Iron Castings."

Mr. Scott presented an interesting discussion on shrinkage and ways to be taken to overcome it. He found to produce a sound casting, special gate and riser had to be used. The method was to choke metal into the riser and fill the mold from riser with a short flat gate. This method eliminates shrinkage and to explain the reason, the temperature of the sand was measured. It was found that the sand under the riser and under the gate between the riser and the mold was the hottest. From experiments, Mr. Scott realized that the temperature of the sand had as much if not more bearing on the successful feeding of the casting than the iron itself. The talk was followed by a lively discussion.

The next meeting of the chapter will be held Feb. 14, at Rockford, and the speaker will be P. A. Paulson, Gunite Foundries, Rockford, whose subject is, "Gates and Risers —Gray Iron,"—*Henry C. Winte, technical secretary.*

Reading

REGULAR monthly meeting of the Reading Foundrymen's association was held Dec. 20 at the Wyomissing club with 29 members present. J. B. Greenstreet, Textile Machine Works, Reading, Pa., and president of the association presided.

Speaker of the evening was H. W. Kelly, Meehanite Metal Corp., who spoke on the use of modern equipment and cost reducing machinery in the cleaning room and cupola operation. Numerous questions were asked by members present and a short discussion followed on various phases of foundry operation.

Report of the membership committee was given by Charles Mundell, Fairmount Foundry Co., Hamburg, Pa. and chairman of the committee. It was recommended by the

(*Continued on page* 52)

Ohio Ferro-Alloys Corporation

Canton, Ohio

(*Continued from page* 50)

committee that a list of foundries of the area be printed, showing the association's membership. The secretary was instructed also to have new membership application blanks printed. Speaker's committee plans to distribute to members a list showing the dates of meetings during the coming year and giving names of speakers for the meetings. The entertainment committee passed cigars to all present.—*H. C. Cummings, secretary.*

Cincinnati

PRELIMINARY organization meeting attended by representatives from Cincinnati, Hamilton, and Dayton, O., was held at Hotel Gibson, Cincinnati, on Jan. 13, to discuss formation of a local chapter of the A.F.A. for that vicinity. Considerable enthusiasm was shown, and a temporary chairman and some committees were appointed. Further details were to be developed at a meeting scheduled for Jan. 30.

Conn. Nonferrous

OFFICERS for 1939 were elected by members of the Connecticut Nonferrous Foundrymen's association at the regular meeting Dec. 20 at Hotel Duncan, New Haven, Conn. Reelected were: President Howard A. Phelps, Phelps Foundry Co., Ansonia, Conn.; vice president, D. Wesley Case, Belknap Mfg. Co., Bridgeport, Conn.; treasurer, Ernest F. Stone, Consolidated Ashcroft Hancock Co., Bridgeport; secretary, Louis G. Tarantino, 670 West Jackson avenue, Bridgeport. Technical secretary, Frank B. Diana, Whipple & Choate Co., Bridgeport, and assistant technical secretary, Byron Reid, Reading, Pratt & Cady Co., Hartford, Conn., were newly elected. The entire executive committee was re-elected, which is comprised of: chairman, T. Joseph Judge, Jenkins Bros. Co., Bridgeport; S. W. Chappell Sr., Electric Boat Co., Groton, Conn.; Fred B. Clarke, Whitehead Bros. Co., Providence, R. I., Byron Reid, Reading, Pratt & Cady Co., Hartford; G. S. King, Malleable Iron Fittings Co., Branford, Conn.

G. H. Banks, Nassau Smelting & Refining Corp., New York, spoke on copper, giving a brief history of the element and then displaying movies provided by the bureau of mines experiment station entitled, "Copper Mining in Arizona." Also films provided by Western Electric Co. were shown which displayed copper in its various stages from the mine to the finished wire. A large attendance was present, about 52, and the meeting was presided over by H. A. Phelps, president of the association. —*Louis G. Tarantino, secretary.*

Northern Iowa

MONTHLY meeting of the Northern Iowa Foundrymen's association was held at Hotel Russell Lamson, Waterloo, Iowa, Dec. 20 with approximately 60 members, guests and their wives present. This was the regular "Ladies' Night" meeting.

Entertainment for the first part of the evening was provided by J. C. Curtis, station manager of United Air Lines Transportation Co., Des Moines, Iowa. Mr. Curtis discussed progress made in air travel, recent mechanical developments and safety devices. The speaker then showed an interesting film, "Coast to Coast by Plane" illustrating an overnight flight from New York to Los Angeles on the United Air Lines' Mainliner.

Second portion of the evening's entertainment was provided by Frank J. Collard Motor Co., Inc., Dodge representative, which showed an entertaining film, "Wheels across Africa." These pictures were taken on a trip made in trucks across the Atlas mountains, in the Sahara desert, and then through game country to the Southeast coast. The shots of wild game were some of the best seen in any travel pictures of Africa.—*R. Wilke, president.*

Northern California

THE Northern California chapter of the A.F.A. met on Friday Jan. 13 at the Riviera, San Francisco, with an attendance of 51. Chairman John D. Fenstermacher presided.

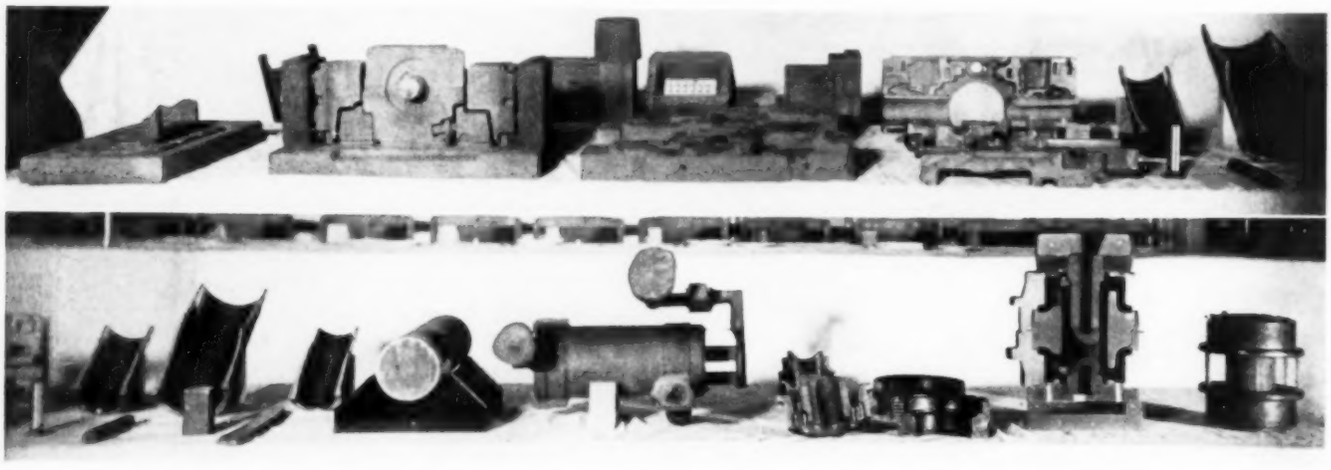
Al Zima, International Nickel Co., Los Angeles, brought greetings from the Southern California chapter. Charles Hoehn as national director spoke on the coming convention at Cincinnati, and on the general condition of the association. Dr. E. M. Parlett, Columbia Steel Co., gave a short resume of work done on silicosis, and introduced A. Harry Field, industrial insurance, who spoke briefly on industrial insurance.

The main speaker was E. C. Hummel, general manager of Utility Electric Steel Foundry, Los Angeles, and a member of Division No. 8 Advertising and Trade Promotion Committee, Steel Founders' society. He gave an hour's showing of special pictures of steel castings, illustrating what could be done to great advantage by use of electric welding. This series of pictures had been contributed by the steel founders of the Pacific coast, and shown for the first time in Los Angeles on Sept. 15, 1938. Results obtained held the close attention of the audience.

The chairman announced the appointment of a nonferrous committee consisting of: Fred A. Mainzer, chairman, P. W. Schumacher, Fred deSanno, M. E. Greenhow, Chris Jacobsen, and stated that the committee would have charge of the March meeting.

Special emphasis was laid on the desire for a full attendance at the foundrymen's meeting at Fresno on April 22. A two-man committee consisting of Charles Hoehn and Clar-

(*Concluded on page* 55)



Some of the castings and cores exhibited by M. J. Gregory at the Northeastern Ohio Chapter meeting

ADVERTISING PAGES REMOVED

(*Concluded from page* 52)

ence Henderson, was appointed to work with the Fresno committee and the committee from the South. The chapter's February meeting will be passed due to the Steel Conference fifteenth annual meeting at Del Monte falling on February 9-10-11.—*George L. Kennard, secretary.*

Buffalo

ANNUAL stag night for the Buffalo chapter of A. F. A. was held in Hotel Tourraine, Buffalo, Jan. 9. Approximately 119 foundrymen and their friends sat down to an excellent steak dinner. Several solos and duets were sung and the crowd joined in the choruses to revive many old ones. About 8:30 everyone went to the Washington room where a real floor show was put on which ended about 10 p. m. This was the largest group to attend a Buffalo chapter gathering, drawing foundrymen from Olean, Rochester, Medina, Lockport, Corry, Lancaster, Depew, Niagara Falls, Dunkirk, Silver Creek, Brocton and Buffalo.—*J. R. Wark, secretary.*

EDITOR'S NOTE: Through an oversight, THE FOUNDRY neglected to give credit to J. R. Wark, Queen City Sand & Supply Co., Buffalo, and secretary of the Buffalo chapter for the photographs reproduced on page 50 of the January issue and illustrating scenes at the recent Cornell regional conference. THE FOUNDRY takes this opportunity of thanking Mr. Wark for his kind co-operation.

Twin City

THE Twin City Foundrymen's association held its regular meeting Monday, Jan. 16, 1939, at the University of Minnesota, as guests of the Mechanical Engineering Department of the Institute of Technology. Sixty-eight attended the dinner at the Minnesota union and over 100 attended the open house at the engineering shops following the dinner.

The dinner meeting was presided over by the president H. H. Blasjo, metallurgist, Minneapolis Electric Steel Casting Co. Dr. Fulton Holtby, instructor in charge of the university foundry, had charge of the program for the evening. Brief talks were given by Prof. C. A. Koepke, administration assistant to the dean, and Prof. J. R. DuPriest, head of the Mechanical engineering department. Mr. Holtby then outlined in detail the various courses given to the students of the institute of Technology.

Some of the things of particular interest exhibited in the foundry laboratory were, chemical control laboratory, sand testing laboratory, x-ray equipment, high temperature thermocouple, high temperature resistant type experimental furnace, and synthetic molding sand.—*O. W. Potter, secretary.*

Birmingham To Hold Annual Meeting

Exceptional value to foundrymen and allied interests is promised in the 2-day program arranged for the seventh annual Birmingham District Foundry Practice meeting to be held at the Tutwiler hotel, Birmingham, Ala., on Feb. 23 to 25. This will be the first meeting sponsored solely by committees of the Birmingham chapter. Technical sessions of the meeting will be devoted largely to discussions of a varied list of specific problems suggested by foundrymen in the Birmingham district.

One session of general interest will be devoted to production of pig iron. Problem of mold facings and washes will be discussed at another session. Nonferrous foundry practice will also receive attention. Control of pinholes in enameled castings, advanced methods of foundry job evaluation, and the perennial problem of gates and risers will be covered in other sessions. Two mornings have been set aside for plant visitations to the Tennessee Coal & Iron Co., McWane Cast Iron Pipe Co., Stockham Pipe & Fittings Co., American Cast Iron Pipe Co., Caldwell Foundry & Machine Co., National Cast Iron Pipe Co., U. S. Cast Iron Pipe Co., Dixie Bronze Co., and many others.

Personnel of the committees is as follows: Program—W. E. Jones, Stockham Pipe & Fittings Co., Birmingham; C. K. Donoho, American Cast Iron Pipe Co., Birmingham; M. L. Carl, Sloss-Sheffield Steel & Iron Co., Birmingham, and R. A. Donaldson, Woodward Iron Co., Woodward. Membership and attendance—A. S. Holberg, Alabama Clay Products Co., Birmingham; Harry Mouat, Whiting Corp., Birmingham; Fred K. Brown, Adams, Rowe & Norman Co., Birmingham; H. A. Newbury, Newbury Mfg. Co., Talladega; William Oberhelman, Hill & Griffith Co., Birmingham; R. V. Hamilton, Foxboro Co., Birmingham; Tom Bellsnyder, Jefferson Foundry Co., Birmingham, and Frank Hamilton, Alabama Pipe Co., Gadsden.

Publicity—T. H. Benners Jr., T. H. Benners & Co., Birmingham, and T. C. Ford, Electro Metallurgical Sales Corp., Birmingham. Entertainment—William Oberhelman; R. R. Deas Jr., American Cast Iron Pipe Co., Birmingham; John B. Hayes, Electro Metallurgical Sales Corp., Birmingham; S. B. Murray, Smokeless Fuel Co., Birmingham; T. H. Benners Jr.; Guy Bagley, Republic Steel Corp., Birmingham; R. M. Marshall, Woodward Iron Co., Woodward; J. A. Bowers, American Cast Iron Pipe Co., Birmingham; Joe Gilbert, Stockham Pipe & Fittings Co., Birmingham; Harry Mouat; W. J. Bullock, W. J. Bullock Co., Birmingham, and Ed Rowe, Adams, Rowe & Norman Co., Birmingham.

Tentative program follows:

Thursday, Feb. 23

9:00 a.m.—Registration.
10:30 a.m.—Technical session.
Chairman, W. E. Curran. Subject: "Blast Furnace Production of Foundry Pig Irons", by C. S. Lawson, general superintendent, Sloss-Sheffield Steel & Iron Co.
12:30 p.m.—Luncheon.
Presiding, Karl Landgrebe. Guest speaker: Marshall Post, president of the A.F.A., and vice president and general manager, Birdsboro Steel Foundry & Machine Co.
2:30 p.m.—Technical session.
Chairman, S. J. Price. Subject: "Causes and Effects of Pin Holes in Stove Plate Castings", by D. B. Noland, superintendent, Gray & Dudley Mfg. Co.
4:00 p.m.—Technical session.
Chairman, S. D. Moxley. Subject: "Job Evaluation", by A. H. White, chief engineer, Stockham Pipe Fittings Co.
4:00 p.m.—Technical session.
Chairman, J. T. MacKenzie. Subject: "Selection and Uses of Nonferrous Alloys", by John W. Kelin, Federated Metals division, American Smelting & Refining Co.
7:30 p.m.—Entertainment.
Presiding, Harry Mouat. Motion picture: University of Alabama-University of California football game.

Friday, Feb. 24

9:00 a.m.—Plant visitations.
Arrangements for visits to be made at registration desk.
2:00 p.m.—Technical session.
Chairman, J. E. Reynolds. Subject: "Foundry Facings and Mold Washes", by Edwin J. Klumb, chief chemist, Hill & Griffith Co.
3:20 p.m.—Technical session.
Chairman, J. M. Franklin. Subject: "Gates and Risers", by Pat Dwyer, engineering editor, THE FOUNDRY.
7:00 p.m.—Annual banquet.
Presiding, Charles Saunders. Toastmaster, W. Carson Adams. Guest speaker, Charles White, vice president, Republic Steel Corp.

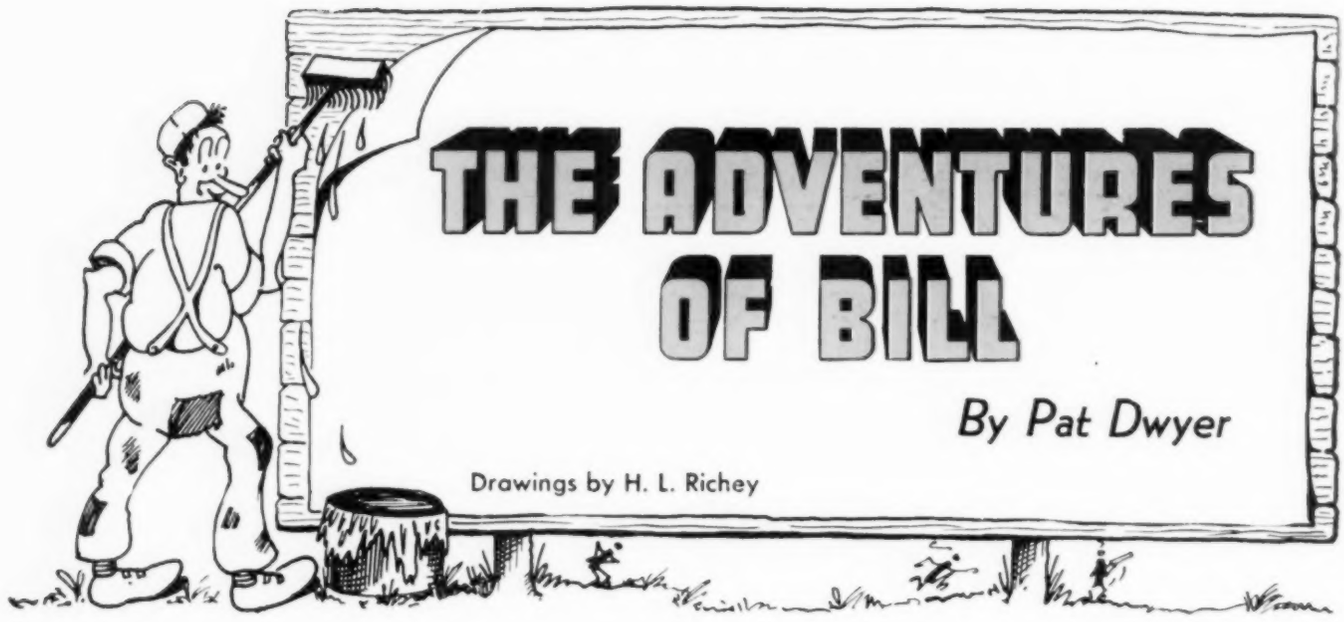
Saturday, Feb. 25

9:00 a.m.—Plant visitation.

Opens Warehouse

Allis-Chalmers Mfg. Co., Milwaukee, recently opened a branch office and warehouse in the Industrial Office building, 1060 Broad street, Newark, N. J. C. A. Pihl has been appointed manager of the Newark office.

Bureau of Mines, Washington, has published technical paper 586 on "Notes on the Sampling and Analysis of Coal," by A. C. Fieldner and W. A. Selvig. Copies of the paper may be obtained from the superintendent of documents, Washington, for 10 cents.



THE ADVENTURES OF BILL

By Pat Dwyer

Drawings by H. L. Richey

I INTENDED to mention this some time back," Bill said, "but what with the jocund season of Christmas and Sandy Claws and all that kind of stuff, it kind of slipped my mind. Must have been about the middle of November this bird came in to see me. Gave me a kind of a jolt to see his gray hair and other evidences of the marching years and to realize that he was the sprighly, black haired young fellow who worked with me in a down east shop some 35 years ago. At first I did not recognize him—"

"What is this?" I interrupted. "A new version of the story about the two drunks? One says to the other, 'Hey, feller do you know Jim Mason?' The second fellow says. 'What's his name?' The first lad says. 'What's who's name?' The second lad comes back with. 'This here bimbo you're looking for.' The first drunk waves his hands in a hopeless gesture. 'Never heard of no bird by that name,' says he. 'How about throwing another one down the rat hole?'

"Who is this lad you are talking about? Outside the fact that he had the misfortune to work with you in a prehistoric era, what is there to distinguish him from hundreds of others who had the same experience. If all the birds who worked with you at one time or another were laid end to end—I will not say what a happy world this would be—but if they were laid end to end, the line probably would extend around the earth at the equator with enough material left over to tie in a true lover's knot with the loose ends running down their easting on several adjacent parallels of latitude."

"'Tis highly gratifying," Bill remarked complacently, "to note the impatience, the eagerness with which you lap up the precious gobs of information and then cry for more. Nothing is more discouraging than to start talking to a fella and after the first few sentences find that he is not even listening. My invariable custom on occasions of that kind is to throw down the tools and quit right there and then. No need of laying down the shovel and the hoe in the present instance. I can see by the kindling eye, the flushed cheek and the—er—ah—slightly drooling lips that you are prepared to follow me if necessary to Tiernan N'Ogue and back again so that you will not miss a single, solitary word."

"If I thought," I said bitterly, "that there was the slightest chance of the Little People on Tiernan N'Ogue grabbing you be the heels and transmografying you into a banshee, I should be glad to follow you to that enchanted island lying some where off the coast of Ireland and visible only to those with a cargo of mountain dew aboard. Unfortunately we are at present in the wilds of North America, 500 miles from the sea coast and with an additional 3000 miles of exceedingly rough and boisterous Atlantic ocean lying in wait off the coast to take everything you have. Furthermore I have no potheen to fortify myself on the journey or to enable me to see whatever is to be seen at the mythical journey's end. All of which brings us back to where we started. Who was the old man of the sea, the ci-devant molder who popped out of the bush a few months ago? I am reasonably certain of one thing and that is you were out to the tune of approximately four bits when he flew away."

"Well," said Bill, "I'll tell you. 'Tis true he nipped me for a small donation for the cause. What cause? Why, because he wanted it, or upon second thought he may have made the touch merely through force of habit. I did not pry into his motives. If I was to ask you for four bits at this present identical moment—I feel reasonably sure you would not unwind the cod line from around the weasel skin purse—but if I was to ask you for this trifling advance, I should resent a string of nosey questions on what I intended to do with this—to you—vast sum of money."

"The four bits I keep for lending," I said, "is or are burning a hole in the pocket of my youngest son at the moment. If and when—an extremely doubtful contingency—the

(*Continued on page* 58)

Perhaps Darwin was not so far out

On Any Type of Portable Grinder

You'll Like the Performance of NORTON WHEELS

SNAGGING a casting with a straight wheel on a pneumatic grinder, cleaning out a hole with a small wheel on a flexible shaft machine, surfacing a casting with a cup wheel on a high-cycle electric—different types of jobs, different types of machines in each illustration, but one common denominator — a fast-cutting, long-lived Norton Wheel.

No matter what type of work you may be doing in your foundry, you can be sure that there are Norton Wheels for you—wheels that are right in size and shape, abrasive and bond, grain and grade for your jobs and for your grinders.

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NORTON ABRASIVES

(*Continued from page* 56)

loan is returned I shall place your name on the waiting list, provided you leave your right eye or other trifle as collateral. Pray proceed."

"I do not regard my recent donation either as a loan or as charity. I parted with it as freely as I part with a similar or greater sum at the entrance to a show place or museum. I parted with it cheerfully in the realization that I was privileged to look upon one of the last if not actually the last specimen of a practically extinct species, to wit: The American hobo molder.

"In my apprentice days and for many years afterward these wandering knights of the shovel and rammer roamed from coast to coast, free as the birds of the air. They were not quite as numerous as the buffalo herds or the passenger pigeons, but on the other hand as you might say, stray specimens have been seen in territories never visited by either the buffaloes or pigeons. Those kind of places referred to one time by a political windbag as, 'The virgin soil on which the hand of man never yet has set his foot.'

"Buffalo Bill killed all the buffaloes. Farmers and hunters killed all the pigeons. Changed operating methods and economical conditions practically have wiped the hobo molder from the foundry picture. I had not seen one for several years until this lad I am telling you about blew in to see me, his only credential the fact that we had worked in the same shop half a life time ago.

"He left home at the age of 17 and now at 55 he is thinking of settling down permanently some place as a gas station attendant, chicken raiser or janitor. He has been everywhere and—to his mind—has seen everything worth seeing and a great many things, to use his own words, 'Not even worth a look.'

Visitor puts the bee on ye Ed.

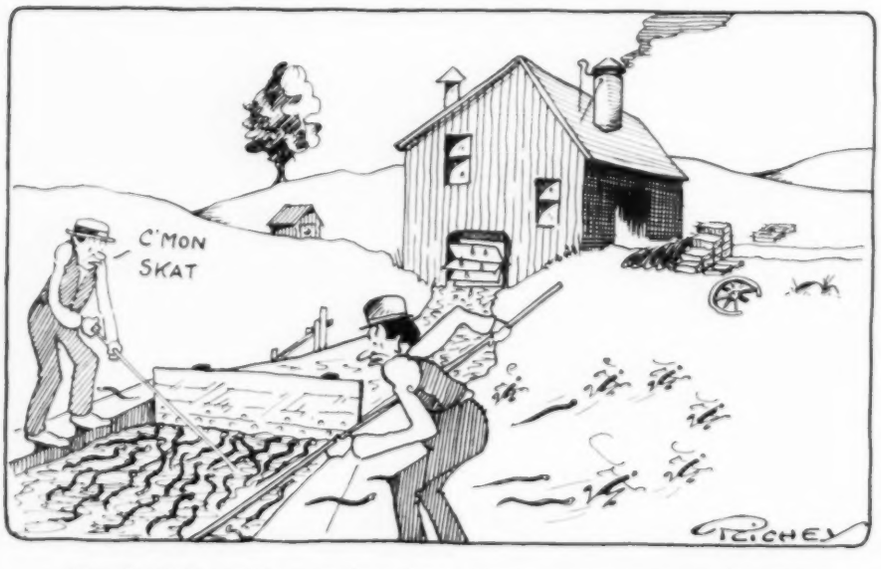
"'People and places,' the comrade still talking, 'is just the same all over, Kennebunkport, Maine; Pickle Hollow, Indiana; Mustang Creek, Montana; or Sunny Acres on the old Camino Real, California. I been from coast to coast a dozen times, maybe more, hit every town from the Great Lakes to the Gulf zig-zag and catty corner and I just as soon settle down in one as another. The foundry game ain't what she used to be. In the good old days a fella could get a job any place. Men coming and going all the time. Take up any thing, iron, brass malleable or steel, bench, side floor or under the big hook. Not any more.

"'One time all a gink has to do is hit the gaffer up for a job, show his card to the shop committee and go to work. If he decides to quit at the end of a week or a month or even in the middle of the day, why, that's all right. He draws his time and ketches the first freight out of town. He is not fussy whether she's headed north, south, east or west. He knows that eventually he'll come to a town, and that if there is a foundry in the place he will get a job. His wants are few and simple and he does not need to work every day to make enough to get by. 'Hell,' says this honest comrade, 'all this hollering and bull shooting over the 32 and 40 hour week gives me a laugh. I been working them kind of hours for years.'

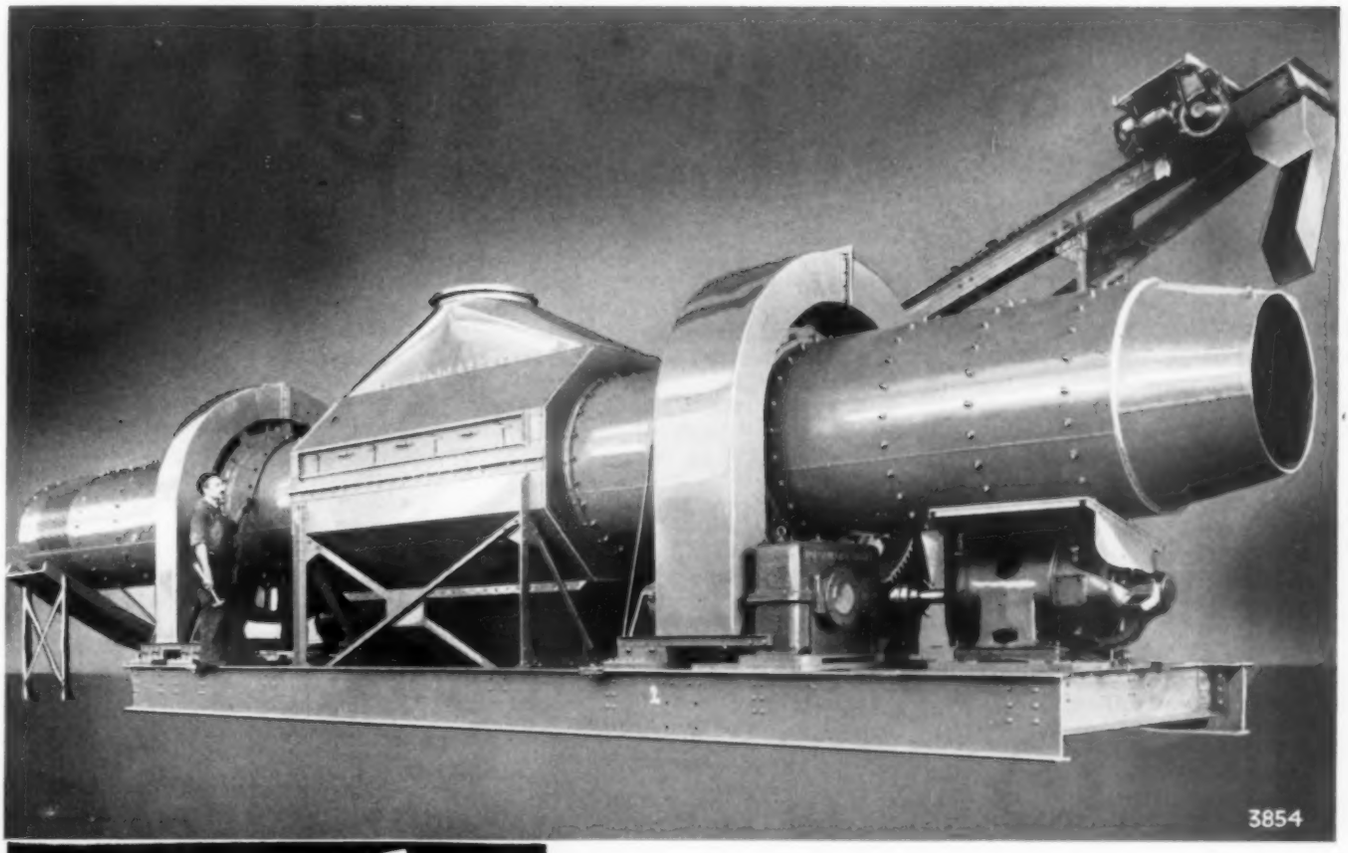
"'When you go to one of the big shops now looking for a job you never see the bull of the woods or get a chance to circulate among the boys. All that stuff is out. You go into an office where you are supposed to take off your hat to a smooth bimbo sitting behind a desk. He ain't interested in where you worked or how good you are. He takes a look at your knob and if he notes a tinge of gray, you're down and out right there. The interview is over. Even if you are young and nimble you are still viewed with suspicion until after a doctor has certified that you are not afflicted with wind galls, spavins, botts, worms, warts, callouses on the feet or elbows, or a drop on the end of your nose which shows that you have dia—, something or other, I forget the word. You know when the old kidneys ain't slagging properly.'

"The comrade," Bill continued, "was quite out of sympathy with all this new fangled stuff and had decided to quit the trade. He had over stayed his usual period in the North looking around for a suitable opening. Should have started on the annual southern pilgrimage a month before, but now was on the way and if I cared to contribute a trifle toward the maintenance fund, he never would forget me. Why this promise on his part should be considered what the boys of the law call a quid pro quo, was not made exactly clear, but it seemed to ease his conscience and I did not want to hurt his feelings by injecting the cynical note. He had not quite decided which railroad to patronize on the trip south, but since he had no intention of paying any fare, the feature really was of little moment. He had ridden them all at one time or another, Big Four, L. & N., the Southern, Queen and Crescent, the Central of Georgia and the Sea Board. The side door pullman accommodation practically was the same on every line. On a certain dark night in Birmingham he inadvertently had boarded a car filled with mules and later had written an indignant letter to the president of the road complaining about the crowded and insanitary conditions—never got a wink of sleep all night—but although he had plainly indicated his

(*Concluded on page* 94)



Founder bids goodbye to bottom dolla' when eels gang up in Walla-Walla



● Sly Continuous Tumbling Mill, 48" diameter, 40' long. All parts of mill, such as bull rings, gears and liners made of wear-resisting alloys. Equipped with variable speed motor. In background, conveyor for bringing stars from discharge to loading end. A foundry now using one of these mills cleaned and cooled 11½ tons of fittings per hr. (average).

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★ This continuous tumbling mill offers many advantages for production foundries. It takes the castings as fast as they come from the shakeout, cleans and cools them sufficiently for subsequent operations.

Eliminates bottle neck in the production line . . . avoids waiting for cooling . . . saves labor in handling castings . . . speeds up sorting . . . conserves floor space (ordinarily required for cooling). Made in sizes to fit all types of production foundries turning out "chunky" castings such as pipe fittings, hydraulic brake parts and other similar castings.

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BLAST CLEANING EQUIPMENT — SLY — TUMBLING MILLS

DUST CONTROL EQUIPMENT FOR EVERY INDUSTRIAL PURPOSE

St. Paul's from Ludgate Circus

London Congress Offers Attractions

FOUNDRYMEN from all parts of the world will attend the 1939 International Foundry congress to be held in London in June. As announced in the January issue of THE FOUNDRY, activities in connection with the congress will extend from June 12 to 30. Presentation of papers and visits to plants in the vicinity of London will feature the activities from June 11 to 17, and this will be followed by two tours of the British Isles.

The post congress tour will begin on Sunday, June 18, and will include inspection of plants in Birmingham, Derby, Sheffield, and Manchester. The second week of the tour, arranged for those who have sufficient time, will include Glasgow, River Clyde, Edinburgh, and Newcastle-upon-Tyne.

The congress and the post congress tours offer many attractive features for American foundrymen. Judged by the enthusiastic reports of members of the American delegation, who attended the previous London International congress in 1929, the various events of the congress plus the post congress tours will be most enjoyable. Published information on the details of the International congress, as prepared by the Institute of British Foundrymen, will be available shortly for distribution in America. Information also is given in the accompanying box concerning the steamships leaving for England just prior to the opening of the congress and also those returning to the United States in the period immediately following the congress and the tours.

The following hotels have been recommended by the committee: Dorchester, Park Lane, W. 1.; Grosvenor House, Park Lane, W. 1.; Goring, Grosvenor Gardens, S. W. 1.; Ritz, Piccadilly, W. 1.; May Fair, Berkeley Square, W. 1.; Park Lane, Piccadilly, W. 1; Victoria, Northumberland avenue, W. C. 2.; Grosvenor, Victoria, S. W. 1.; Oddenino's, Picadilly Circus, W. 1.; Washington, Gurson street, W. 1.; Alexandra, Hyde Park Corner, W. 1.; Howard, Norfolk street, Strand, W. C. 2.; and Berners, Berners street, W. 1.

The International Relations committee of the A. F. A. will undertake to have an inclusive tour organized if a sufficiently large group of American foundrymen indicate a desire to travel to England and to return to the home port on the same steamer. The inclusive tour would consist of the transatlantic passage, transportation between the port of arrival and London, hotel accommodations in London, and the post convention tour.

Therefore Americans interested in the possibility of attending the coming International congress in London are urged to notify at once either Frank G. Steinebach, chairman of International Relations committee, Penton building, 1213 West Third street, Cleveland, or Robert E. Kennedy, secretary, American Foundrymen's association, 222 West Adams street, Chicago.

EASTBOUND SAILINGS

Steamer	Line	Sailing from New York	Port of Arrival	Date
MANHATTAN	United States	May 31	Plymouth	June 6
CALIFORNIA	Anchor	May 31	Glasgow	June 9
HAMBURG	Hamburg American	June 1	Southampton	June 8
STATENDAM	Holland America	June 2	Plymouth	June 9
FRANCONIA	Cunard White Star	June 2	Southampton	June 11
ILE DE FRANCE	French	June 6	Plymouth	June 12
COLUMBUS	North German Lloyd	June 6	Plymouth	June 13
QUEEN MARY	Cunard White Star	June 7	Southampton	June 12

WESTBOUND SAILINGS

Steamer	Line	Port	Sail	Arr. New York
MANHATTAN	United States	Southampton	June 16	June 22
FRANCONIA	Cunard White Star	Southampton	June 17	June 25
MAURETANIA	Cunard White Star	Liverpool	June 17	June 23
DE GRASSE	French	Southampton	June 17	June 25
VOLENDAM	Holland America	Southampton	June 17	June 27
AQUITANIA	Cunard White Star	Southampton	June 21	June 27
NORMANDIE	French	Southampton	June 21	June 26
COLUMBUS	North German Lloyd	Southampton	June 21	June 28
GEORGIC	Cunard White Star	Southampton	June 22	June 30
LACONIA	Cunard White Star	Liverpool	June 23	July 3
CHAMPLAIN	French	Southampton	June 23	June 30
NIEUW AMSTERDAM	Holland America	Southampton	June 23	June 29
CALIFORNIA	Anchor	Glasgow	June 23	July 2
PRESIDENT ROOSEVELT	United States	Southampton	June 23	July 1
BREMEN	North German Lloyd	Southampton	June 24	June 29
ST. LOUIS	Hamburg American	Southampton	June 25	July 5
QUEEN MARY	Cunard White Star	Southampton	June 28	July 3
ILE DE FRANCE	French	Southampton	June 29	July 5
HANSA	Hamburg American	Southampton	June 30	July 7
CAMERONIA	Anchor	Glasgow	June 30	July 9
WASHINGTON	United States	Southampton	June 30	July 6
SAMARIA	Cunard White Star	Liverpool	July 1	July 10
EUROPA	North German Lloyd	Southampton	July 1	July 6
VEENDAM	Holland America	Southampton	July 1	July 11
STATENDAM	Holland America	Southampton	July 4	July 11
NORMANDIE	French	Southampton	July 5	July 10

ADVERTISING PAGES REMOVED

Wide Range Of Alloys Available

(*Continued from page* 26)

the effect of the impurities is much the same as that of the series M, N, O, and P, previously described. However, since these compositions are used in many instances for different purposes than that of the other series, there are occasions when competent metallurgists would permit some of these impurity values to creep up above the figures described for the other series.

Compositions BB, CC and DD are high tensile yellow brasses but are known commonly as manganese bronzes, a misnomer since they really are yellow brasses with the addition of appreciable amounts of iron and aluminum. The tensile strength of these is much in excess of the regular yellow brasses and they have many other physical characteristics that are improved as indicated by Table II (THE FOUNDRY for January, page 76) describing their physical properties. These compositions in general are high shrinkage alloys and, therefore, demand plenty of feeding during solidification.

Must Be Fed Properly

Castings made from them must be supplied with ample risers so located that all heavy spots are fed properly. If proper provision is made for feeding the castings during this process of solidification, these alloys resist leakage under hydrostatic pressure in a very satisfactory manner. They should be gated carefully so that scum spots formed from aluminum oxide are not present in the castings.

They should never be plunged in water upon removal from the mold in order to cool them off. Quenching in water in that way is disastrous to the elasticity and other important physical properties. However, it may not be evident in every case since the wall thickness of the casting is such that the quenching has not taken place before the casting had become cool enough to prevent serious damage.

All three of these compositions, which are typical of a wide variety of alloys known as manganese bronze, are affected by impurity values. Presence of lead, for example, even in small quantities such as 0.5 per cent, affects the tensile strength adversely and if more than 0.5 per cent is present in any one of these three compositions, the ultimate tensile strength and yield point are reduced appreciably. However, machinability is improved sometimes by presence of lead. Silicon and magnesium promote brittleness, reducing elongation and therefore are undesirable.

Phosphorus above 0.05 per cent or thereabouts is likely to cause porosity. Antimony, cadmium and bismuth all tend to cause hot shortness and are objectionable if present in percentages above 0.05 per cent. These manganese bronzes sometimes contain tin up to 1½ per cent and sometimes none at all. Tin has a hardening effect and in many instances develops characteristics desirable for specific purposes.

There are no instances where absence of tin is absolutely essential except possibly from the standpoint of first cost, since tin is the highest priced ingredient. It will be noted that the federal specifications QQB 726 specify 1½ per cent tin as a maximum but there is no demand that the tin shall be present in the alloy.

Use Nickel Addition

Some of these manganese bronzes have a part of the copper replaced by nickel; 1 pound of nickel replacing about 1.1 pound of copper. This additional element means further complications in manufacture and while there are those who prefer to have some nickel present, it is not at all uncommon to find manganese bronzes without nickel. Where nickel is present, the aluminum content must be at a minimum. Government specifications as well as those of the A.S.T.M. and S.A.E. do not require a nickel content.

Since this series of compositions is made up of a number of elements, the variation in the percentage of any one of which influences the characteristics of the resulting castings, the characteristics for any composition chosen by any one manufacturer must be determined by test of the alloy which has been chosen.

Composition BB is known as a high iron, high aluminum manganese bronze, sometimes spoken of as a super manganese bronze or extra high tensile strength manganese bronze. This composition is to be found on the market with a varying amount of iron, manganese and aluminum. Sometimes the iron is up to 3½ per cent instead of 2¾ per cent as indicated. The manganese is sometimes lower, even to 2½ per cent and the aluminum sometimes is found to be somewhat lower, around 5 or up to 7 per cent. The percentages given are for a composition, having a relatively high tensile strength for a cast alloy and a good yield point with a satisfactory elongation, as well as good brinell hardness.

This composition is used regularly for spur gears, gibs, cams and many other machine parts where high unit stresses are met. This composition also serves in engineering parts to permit reduction of size or thickness of parts, since the higher tensile strength, as compared with other cast materials, still gives ample strength for the service in mind. The high brinell hardness of this composition also permits of its use where some other composition might not be so satisfactory.

Composition *CC* is an example of the standard composition known as manganese bronze which is approximately a 60 per cent copper-40 per cent zinc alloy with additions of iron, manganese and aluminum and frequently some tin in sufficient amounts definitely to improve physical characteristics over that of a straight 60 per cent copper-40 per cent zinc alloy. Composition *CC* is specified by the A.S.T.M. as B54-27 and by the S.A.E. as No. 43. The different standard specifications will be found to vary to some extent but an alloy approximating *CC* will conform to most of these specifications.

Tin Hardens Composition

By increasing the tin, a hardening effect will result. An increase in the zinc up to the maximum permissible also has a tendency to harden. Iron is the essential element if maximum tensile strength is to be secured. Aluminum is essential in helping to alloy the iron properly and to give maximum value. Precision in the control of the relative proportions of each of the different elements is important if uniform characteristics are to be secured. Like all other manganese bronzes, care in the melting department is a prime requisite to good castings and reliable characteristics. Impurities such as lead are undesirable if best results are to be obtained. A maximum of 0.20 per cent lead is permitted by the federal specifications. This is a good limit beyond which lead should not be permitted to go. Zinc containing lead as an impurity should be avoided as a source of the zinc content in these alloys.

Composition *DD* is given as a range of compositions, the copper being indicated as 55 to 60 per cent, zinc from 38 to 42 per cent, iron from 0.40 to 2.0 per cent and other elements are given in terms of maximum percentages. It is evident that there is a wide range of compositions which cover a broad sweep of physical characteristics. This is the manganese bronze specification of the federal specification QQB 726 in the form of castings. In the castings it is covered by federal

form of ingots from which to make specification QQB 731.

It will be noted that the governing factors in these compositions are the physical characteristics required. Minimum ultimate tensile is 65,000 pounds per square inch in the case of the castings, and 70,000 pounds per square inch in the case of ingots. Elongation in 2-inch is 20 per cent in the case of the casting specification and 30 per cent in the case of the ingot specification. Difference in these two figures is explained by the fact that the characteristics of the metal in the ingots are those of a chill cast product; the metal having been cast in an iron mold.

Furthermore, it is believed by some to be desirable to set a high standard for ingot so that when the ingots are remelted and poured into castings any minor variation that may creep in still permit the production of castings that are capable of passing the minimum standards established. The minimum figures in these specifications are rejection limits and not indicative of average characteristics of alloys made within the range covered by the figures of composition *DD*.

Determines Physical Properties

High physical properties may be secured by choosing from the ranges within these *DD* specifications a composition in which the iron and manganese are high, aluminum is up to its limit, and copper at the high limit, thus bringing the zinc to the low limit. Composition *BB* in which the zinc is even lower than is permitted by *DD* and in which the aluminum is much higher, will give even higher physical properties insofar as tensile strength, etc. are concerned.

Composition *CC* may be produced and still be within the range covered by composition *DD*. Yet, the physical characteristics for *CC* differ materially from those of the composition previously suggested having a high manganese, iron and aluminum and low zinc content, both of which are within the range established by *DD*. Cost of manufacture likewise differs much, and as the alloy becomes more complicated by reason of additional elements, greater experience and skill are required to insure satisfactory products uniformly.

It will be noted that this specification limits total other elements, which means impurities or other additions, as 0.20 per cent maximum. That precludes the use of impure raw materials if the best results are to be maintained and if the final anlysis is going to check within the limit specified. Lead also is specified as 0.20 per cent maximum, making a total of lead plus other impurities as 0.40 per cent.

It is well known that compositions conforming to the ranges herein specified regularly indicate in properly fed test bars physical properties that are highly satisfactory from all standpoints, as illustrated by the physical characteristics listed for composition *CC* in Table II in the January issue. It may be well to emphasize here that test bars must be fed well to indicate the true characteristics.

Detroit Foundries

(*Concluded from page* 32)

file. Temperatures are taken by a portable thermocouple and indicated on a large dial in full view of all operators.

Two 1000-pound capacity oil-fired horizontal rotary furnaces are used to melt heats of lead-bearing bronze. Pouring temperatures average 2100-2300 degrees Fahr. For heavy production, three cupola type furnaces are used and there are also available several large oil fired tilting crucible units.

Adjoining these melting units 40 steel cars with low platforms about 6 feet in length and 4 feet wide travel on an elliptical track. One side of this track is flanked by molding machines. As the molds are rammed and assembled they are transferred to the cars and moved around to the opposite side where they are poured. Further travel brings them to a shakeout station where the castings are knocked out. Sand falls through a grating to a sand conditioning system below the floor where the sand is mulled, aerated and properly mixed and conditioned for further use, then conveyed upward to hoppers above the molding machines.

Adjoining this continuous pouring track is the propeller casting section where manganese bronze or aluminum bronze propellers are produced in sizes up to 4 feet in diameter from metal patterns.

Babbitt is applied to backing shells in a third casting department where two types of machines are operated. One is a horizontal indexing machine holding six cylindrical shells. Babbitt is cast centrifugally on the inner surface. An operator dips the shell in a tin base solder, places it on a spindle of the spinning machine and after it is indexed to proper position pours in the babbitt. The machine whirls for an instant to solidify and distribute the metal then indexes again to the discharge station. Tin and babbitt are kept molten in two temperature controlled gas fired pots adjacent to each casting machine.

The second type of machine is a bench with four vertical spindles. A bearing shell is placed on a spindle after being dipped in a cadmium base solder. The spindle is raised and a cap is placed over the shell to direct the metal from a ladle of cadmium base alloy poured into the shell. After solidification the spindle is lowered and the shells are removed and cooled before machining.

It should be pointed out that most bearings are produced as full cylindrical castings with rolled or welded steel shells as backing and are cut apart into halves before final machining operations are performed.

Foundrymen who are not familiar with this type of nonferrous casting can hardly appreciate the careful control necessary at all times—control over chemical and physical properties of the product, melting and pouring temperatures, classification of incoming metals and return material, proper timing of molding and melting operations each one essential to the production of a uniform and acceptable casting.

Deep Fins on Casting

Progress in aluminum casting was emphasized by the display at the recent Society of Automotive Engineers annual meeting of an aluminum alloy cylinder head for a radial aircraft engine. Particularly interesting were the cooling fins, spaced five to the inch and 2½ inches deep. Five years ago, when these heads were cast with fins two to the inch, engineers thought the limit of craftsmanship had been reached. Advancement in molding methods, sands and metal control have made the new design possible.

With Packard launched on a new car program, it is likely some changes will be needed in foundry facilities, to meet production demands. The model will be a light six, with tubular steel frame and other advanced design features, completely new from stem to stern. Early proposals contemplated building 100,000 of this new model in a year. This represents an important boost in Packard production if schedules on present models are maintained. Total Packard production in 1937 was 112,000.

Ample building space is available, but considerable rearrangement of facilities will be required. It is proposed to build a body bridge across East Grand boulevard to bring cars across to the final assembly line. A considerable amount of Packard's sheet metal and machining work is in buildings south of the boulevard, while the foundry, forge shop and assembly operations are north of the boulevard.

The Packard plant is considered to have a peak capacity of 45 cars per hour. On a two shift basis this figures to nearly 200,000 cars per year or well within projected schedules for the new car and present production.

The Large Screenarator

now on PNEUMATIC TIRES

ASK FOR 10 DAY *Free Trial*

Seven years ago, the SCREENARATOR was introduced as the lowest cost, most efficient, portable sand conditioner for preparing backing, facing, and core sand. It is scientifically engineered for foundries, requiring large quantities of sand that will insure smooth, finished castings, free from marks and surface inclusions.

Today, hundreds of these low cost, trouble-free portable sand preparers are exceeding every promise of seven years ago, in every type of foundry—steel, iron, malleable and non-ferrous. The LARGE SCREENARATOR, with double the capacity of the smaller unit, screens out all gaggers, burned cores, wood and other refuse. It double aerates and piles up to 60 tons of open, fluffy, clean sand per hour, depending on the screen mesh—all that four workmen can shovel.

Many shops are using the SCREENARATOR for shaking out small molds.

FREE TRIAL *Offer*

Try before you buy. Ask for details about the LARGE SCREENARATOR and 10 day free trial in your shop. There is no obligation.

PNEUMATIC TIRES *Increase* PORTABILITY

The LARGE SCREENARATOR is easily wheeled from one floor location to another. Pneumatic tires roll readily and smoothly over rough, sand-covered floors, easing the work of the men, and insuring long life and low maintenance. This LAST WORD in large capacity, portable sand conditioning equipment has no gears, being direct connected to the slow speed motor. The entire load is concentrated on the SCREENARATOR axle for proper balance and ease of movement.

The BEARDSLEY & PIPER Co.
2541 NORTH KEELER AVENUE CHICAGO

IT ROLLS LIKE A BIKE..IT SCREENS..IT DOUBLE AERATES..IT PILES

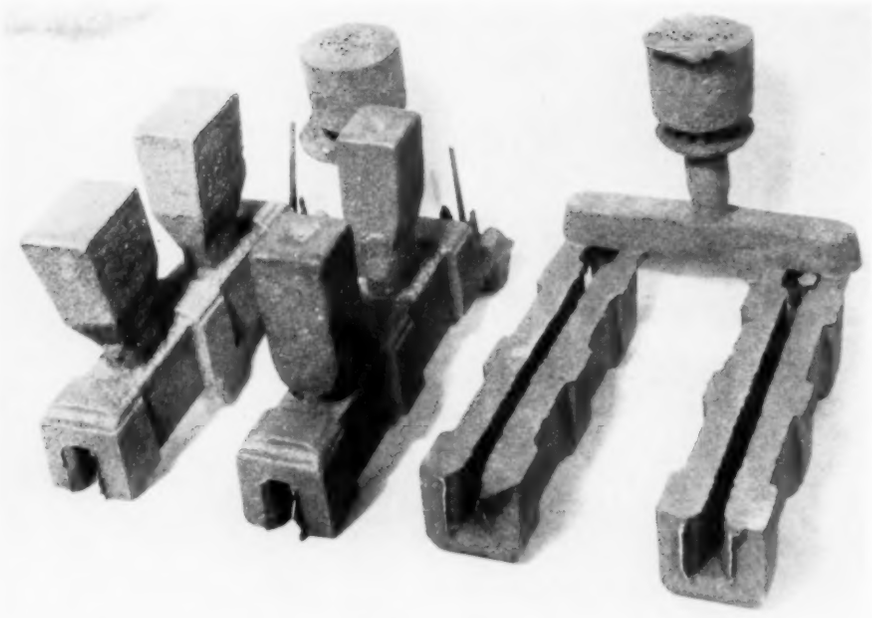


Fig. 4—Where outstanding changes from the original have been made in gates and risers, etc., a photograph of the casting with all those items in place can be attached to the processing record

Shop Control Methods

(*Continued from page* 23)

set for cores, and are quite easily established for cleaning and grinding castings on a linear inch basis of light and heavy chipping or grinding operations. Elements of molding standards are classified to meet loose bench, squeezer, rollover, loose floor or rollover and jolt work. Once these data are at hand they serve not only as an efficient production instrument, but also as a cost basis for ready billing and competitive estimating purposes.

The next requirement for an efficient production control is the establishment of capacity values with regard to: 1. Floor area available; 2. Molding machines; 3. Flask equipment; 4. Cupola capacity or metal produced per hour.

These values, once ascertained, are constant except for double shift work, additional molding machines, increased flask inventory, or if cupola practice should be changed to semicontinuous or continuous pouring.

Where set-up time is involved, or extra time is spent by molders or core makers in securing the necessary riggings for one or more jobs per day, or where oiling and cleaning-up time has to be considered for the productive operator, the required time allowances per day per man must be established to arrive at a *pure* production time for control purposes.

There are any number of production control systems in use; systems usually made to order for the particular foundry, and running from the word of mouth variety to traveling job tags, or addressographed order copies. Following is description of a comparatively simple system which proved its merits and efficiency over years of high as well as low production. The system is adaptable not only for the production foundry, but is of considerable benefit to the jobbing foundry handling from a few to many thousand patterns.

The production record card, Figs. 1 and 2, gives the complete story of a casting as to flask size, number of core boxes and cores required, molding machine, metal specification, weight, molding time, core making time, and cleaning time.

Reverse side of this card, as shown by Fig. 2, serves as a permanent pattern record, a full description of the patterns received or on hand, whether single, loose or boarded production pattern, and storage location by floor, rack and shelf.

This card easily can be designed to suit any local purpose, and can be obtained with the holes punched for the prime digits 1, 2, 4, 7, for code combinations from 1 to 10.

Cards are filed numerically by pattern numbers, and since they are punched in specific places are separated through elimination by a wire rod in one single move into identical molding classes, or metal specifications, or flask sizes, etc. As an order form of any description is received the respective pattern card is pulled from the general file, the quantity on order noted on the reverse side of the card with wanted date, as shown in Fig. 2, and re-filed numerically in an open or working file. The foundry order copy, in the case of the jobbing foundry, is filed away for reference or billing purposes only.

If a production card does not exist,

(*Continued on page* 68)

Table I

Foundry Production Report

May 14, 1938

Patterns involved and minutes available after May 21, 1938:

M/C	Patterns		Minutes		Heat—Days at 8 hours
After week ending	5/14	5/21	5/14	5/21	+ Rush Allow.
10—Squeezers	197	184	433,797	417,384	10 + 2
2—Loose Bench	26	18	8,530	7,125	8 + 6
8 (10)—Rollovers	38	29	106,487	68,220	20 + 3
8—No. 28/34, Davenports	41	35	142,889	128,669	18 + 2
5—No. 40, Davenports	16	13	96,136	84,312	19 + 1
1—No. 48, Davenports	4	3	16,815	14,340	16 + 1
—Loose floor	11	15	48,794	51,116	18 + 4
	333	297	873,448	771,166	
2—Sheaves No. 40	28	34	58,112	64,861	32 + 8
1—Grids (8)	11	8	17,260	15,810	30 + 1
	372	339	928,820	851,837	
Total molding minutes produced, during weeks ended 5/7 and 5/14			118,460	129,732	
Heats	4	4			
Hours	32	32			

+ *Preferences:* Open on May 7th ..... 75 patterns
Add during week ending May 14th ..... 175 patterns

230 patterns
Open on May 14th ..... 75 patterns

Planned, for week ending May 14th—4 heats—all groups, 7:30 A. M. to 4:30 P. M.; (no heat on Wednesday)
CC to Foundry Superintendent
Foundry Manager

WISCONSIN STEEL COMPANY

-:CHICAGO:-

Air view of Wisconsin Steel Company plant by Chicago Aerial Survey Co.

WISCONSIN STEEL COMPANY is well equipped—from raw material source to finished product—to take care of your alloy and carbon steel and pig iron requirements. Our own ore mines, ore boats, coal mines, coking plants, blast furnaces, pig machines, open-hearth furnaces, blooming mill, bar mill, and cold-drawn mill enable us to control our output of high-quality products through every process.

Our large staff of metallurgists and practical foundrymen serves the double purpose of keeping product quality high and rendering a valuable consultation service to our customers.

We invite users of alloy and carbon steel and pig iron to write or phone us for complete information concerning our products.

WISCONSIN STEEL COMPANY

180 North Michigan Avenue Chicago, Illinois

WISCONSIN

Alloy and Carbon Steel **Pig Iron**

(*Continued from page* 66)

a card is made up by pattern number, and completed when time and all other information have been determined. This record represents not only a perpetual sales record for the jobbing foundry, or a consumption record for the production foundry, but is the basis of a continuous production control.

The cards of the working file can be used at any time, and almost instantaneously, to determine the number of charges—heats—number of men or flasks required in each class of molding, etc., to complete the orders on hand at a given time; to establish an even production at the most advantageous terms considering set-ups, or charges per heat, or core-making—molding and cleaning time relationship.

For a great number of orders on hand it has been found advisable to *Flag* the production cards by different colored clips according to urgency, for weekly or biweekly production periods.

The production program Fig. 3 is the only means of conveying all production information to the various molding, coremaking, cleaning and shipping floors. The items can be written in long hand or typed for any reasonable production period, preferably for one week and issued on Wednesday of the preceding week allowing time to arrange for patterns, flask equipment and preliminary cores. This information is compiled quite readily and is scientifically correct since all work planned can be produced in the given time. Floor area, cupola capacity, set-up and pure production time involved, as well as flask equipment have been determined from the production index cards.

Plan Production Floor

Fig. 3 showing part of a planned production for a typical rollover floor, has been set up along the following lines:

1. All rollover work in the working file is separated through elimination as accomplished by the wire rod, into metal specifications to establish the days heat sheets and charges respectively for the cupola gang.
2. The second separation, eliminating all but one flask size, will give the number of patterns requiring the identical flask equipment. The flask inventory shows how many copes and drags of a particular size are available. Orders and quantities are posted on the program according to the wanted or delivery dates.
3. To establish the number of molders, core makers or cleaners required for a given production period the orders on the production program are extended by their respective times as shown by the production index cards.

Foremen of each group consult their production program binders constantly and distribute their quota of work accordingly among their men. Where production is large enough, the foremen or time keepers, will post the daily performance under each casting number.

In many foundries, it will be necessary to arrange period production programs on a 75 per cent or 80 per cent basis only, leaving a certain percentage of capacity open for service and incidental rush orders. This kind of orders should be tabulated in the same manner by 12 o'clock noon as a daily *Preference* sheet, and copies distributed immediately to each department involved. Molds are flagged for identification for the night shake-out gang, so that castings may be cleaned first in the morning.

If full capacity as scheduled by *Production* and *Preferences* is not reached, a few large orders on which delivery is not of importance, are kept as stand-bys or fill-ins.

Every foundry has defective cast-

(*Concluded on page* 71)

CASTING PROCESSING RECORD — 4/20/38

NAME: GIB, 2W.P.-1-1-8#, SPEC. C.1. — PATT. 144-SA-6

PRODUCTION 1937 400 1938 1939 1940 1941 1942

DATE	NATURE OF CHANGE	REASONS	COST OF CHANGE	SAVINGS MINUTES	SAVINGS $	LOSSES MINUTES	LOSSES $	REMARKS
Dec. 1937	Pattern made in cope part, top gate.	New processing for quality of castings	2 hrs.					See seperate tabulation for savings due to automatic sand reconditioning.
	Elimination of 2-1¾"x6¼" lg. heads	New processing and		MU47 5.3	.25			viz. processing photo
	Eliminate drive nails to hold cores-and filing of slots in cores for nails.				(32)			Metal savings: 2 heads at 8# each.
	Reduce cleaning time due to elimination of heads and change in gating			CLL33. 5.4	.18			
May 1938	Change Mixture	#464 (10% steel) to #465 (15% steel)						
	Form Y-2111 (12-37)							

Fig. 5—Processing record card is valuable since it contains all pertinent data relative to the final method of production

ADVERTISING PAGES REMOVED

(*Concluded from page* 68)

ings, detected on the molding floors or by cleaning departments. Hand in hand with production control all defects must be followed up. It has been found of great benefit to assign a location where all defective castings are displayed. Molders of all classifications soon begin to show interest. They are willing and anxious to learn the causes of crushes, drops, blow holes, shifts, scales, etc.

All foremen meet here daily, examining the defectives of the previous heat, determining cause and responsibility, whether due to supervision, molding, core-making or shake-out. Records are kept accordingly. All defectives are posted back onto the production programs in red, amounts red circled, and marked off as they are replaced.

The production report Table I is a handy tool for the foundry manager or superintendent. This production report may be compiled at regular intervals and will act as a perpetual inventory of work on hand. It may be used to decide all policies to be adapted regarding the operations of the foundry.

Effects of this production control system are far reaching, and the foundry manager will see that it must also lead to a definite control of related foundry operations and equipment.

Determine Flask Requirements

Record files of production cards are a positive indicator of necessary flask equipment. Orders on hand can be separated quickly into identical flask requirements. The purchase or manufacture of home made flasks is no longer haphazard, and the first step is made towards standardization of flasks.

As copes and drags have accumulated over years, due to the fact that flasks were made to suit any specific pattern in relation to its production frequency and order quantities, an excessive inventory usually is held to odd and even sizes. Quite often these represent a considerable amount of frozen money, and since flasks are mostly stored in open yards, an excessive depreciation.

It is quite possible to replace 20 to 30 odd flask sizes by one standard flask with few variations in the depths of copes and drags. Necessary alterations to pattern boards are seldom such that the costs are not offset by increased production facilities and efficiency.

After consultation of the production reports over a reasonable period, definite information will be gathered with regard to the purchase or elimination of a specific type of molding machine. If capacity in certain molding groups falls behind actual or potential orders the most suitable machine can be bought, and floor calculations adjusted. Combination of flask and machine equipment information so readily on hand, may influence the decision to change cupola practice from pouring during a limited period to continuous pouring.

Intelligent manipulation of the production cards, which incidently is acquired in comparatively short time, will give quick and definite data in place of guess-work for countless means and purposes affecting almost any phase of foundry operation.

The foundry supervisor looks over the production programs to see where red circled figures indicate defective castings. He is thus in position to reprocess any given job before the number or volume of red circles increases. Faulty molding procedure is discovered before an order is completed. Considerable money may be saved through early prevention by making changes in the gating—using chills—use or eliminate nails—skin drying—alter core boxes—core setting from cope to drag—or even by changing the pattern itself.

Finally, a production control system should incorporate a new processing record. Human memory is extremely short. Lessons learned from expensive experimentation with a new casting frequently are forgotten when the identical casting appears after a long interval. Another molder may have entirely different ideas on the job, and cause experimental molding expenses once more. In our opinion, it has been well worth the trouble to establish a processing record along the lines shown in Fig. 5, for any job with which considerable trouble was experienced at initiation. Once the casting is found perfect in the foundry as well as in the field, the molding procedure, suitable mixture, gates and risers necessary, and all other pertinent data are recorded. A blueprint of the casting may be attached, and gates, risers, heads, etc. marked accordingly. If outstanding changes have been made a photo may be taken, as shown in Fig. 4.

Where foundry expenses are involved, any alterations to a pattern, also savings made through new processing for cost record purposes as well as for recording historical foundry progress should be recorded.

Impact Symposium

Nine extensive technical papers and discussions comprising the "Symposium on Impact Testing" held at the 1938 meeting of the A. S. T. M. now are available in the form of a 170-page publication prepared by the society. Phases discussed are utility and nonstandard impact testing, problems in the field of plastics, notched-bar impact test, charpy test, stress-strain relations under tension impact loading, theory of impact testing, etc. Valuable information in the form of tables and charts is presented. Copies of the publication may be obtained from the society, 260 South Broad street, Philadelphia, for $1.25 each.

Stresses Advances

(*Concluded from page* 33)

gray iron sessions are, as usual, numerous and cover a wide range of subjects such as: "A Study of Cracked Castings"; "Sixty Thousand-pound Cupola"; "Cupola Operation"; "Influence of Undercooling on the Graphite Pattern of Gray Iron"; "Temperature Measurements"; "Effects on Cast Iron of Ladle Additions of Complex Copper Alloys"; "Effects of Heat Treatment on Combined Carbon and Physical Properties of Cast Iron," and "Influence of Composition on Electric Furnace Irons."

Four papers recounting recent work on testing and controlling fluidity or castability of metals are scheduled for a special session. These are on work on cast steel, aluminum, cast iron and malleable iron.

J. A. Kolb, Caterpillar Tractor Co., Peoria, is to present a discussion and demonstration on pattern practice. This will be along the lines of his paper before the Iowa Regional conference last fall, which attracted so much attention at that meeting.

Three papers on apprentice and foreman training are planned. These will be prepared by M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill., Herman K. Ewig, Cincinnati Milling Machine Co., Cincinnati, Co., and W. G. Conner Jr., Walworth Co., Greensburg, Pa.

A special attraction for practically all groups of members will be the four session lecture course which is being planned, to be presented by R. M. Allen, Bloomfield, N. J. This course will cover in detail elementary metallurgy and the use of the microscope in the foundry. The material for this course will be prepared in book form and is to be an extension of the paper given by Mr. Allen before the 1932 convention. Programs for other sessions, such as those on refractories, sand control and materials handling, will be announced later.

Phoenix Iron Co. and the Phoenix Bridge Co., Philadelphia, are moving their general offices from the Girard Trust building to Phoenixville, Pa. A sales office will be maintained in Philadelphia, according to William O. Lange, secretary and general sales manager of the organization.

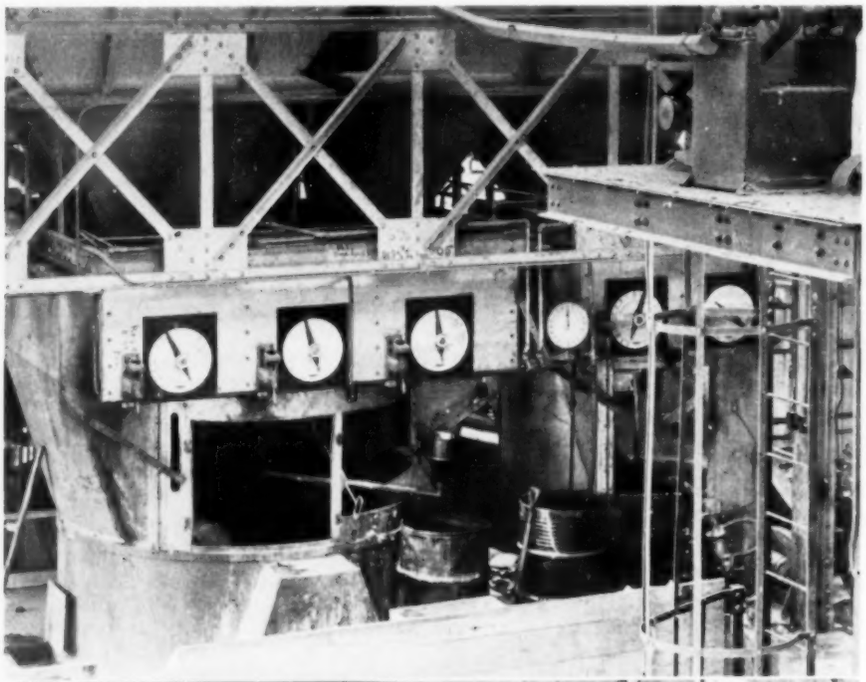
New Steel Foundry

(*Continued from page 25*)

tolerances on nearly all fittings are meager. Anything under the minimum is scrapped. Trouble surely will arise if the cores are not set and secured properly. A typical group of molds with cores ready for gaging is shown in Fig. 13. This illustration was taken at night and illustrates the degree of illumination attained with the artificial lighting setup.

Mold design frequently is the principal factor in satisfactory casting production. Mold design hinges on pattern design and construction. The pattern shop 80 x 100 feet, with walls almost entirely glass, is well lighted and ventilated. All patterns either are made or receive their final checking in this shop. So far as possible, the skill, knowledge and craftsmanship required for the production of sound castings is taken out of the foundry and applied to the pattern equipment. Pattern equipment is designed and constructed so that cores or molds need not be trimmed, filed, slicked or patched. Distortion is anticipated in the pattern to prevent the necessity for excess finish allowance. In the illustration of the fittings in Fig. 12, the heavy, solid lines shown pattern offset to compensate for irregular contraction. By this application of distortion allowance it was possible to reduce the finish allowance on the face of the flanges to ⅛-inch. Contraction or shrinkage allowance must be worked out carefully. Center distances particularly on multihole headers must be maintained within close limits.

Fillets on pressure castings require much more careful determination than on ordinary castings. To function properly the fillet must provide for gradual transition from light to heavy section to avoid stress concentration during solidification and must still provide for as great an exposure to the sand as possible to permit controlled solidification. Effects of these two factors must be correlated carefully in fillet design for pressure fittings. External chills may be required in certain sections to direct progressive solidification.



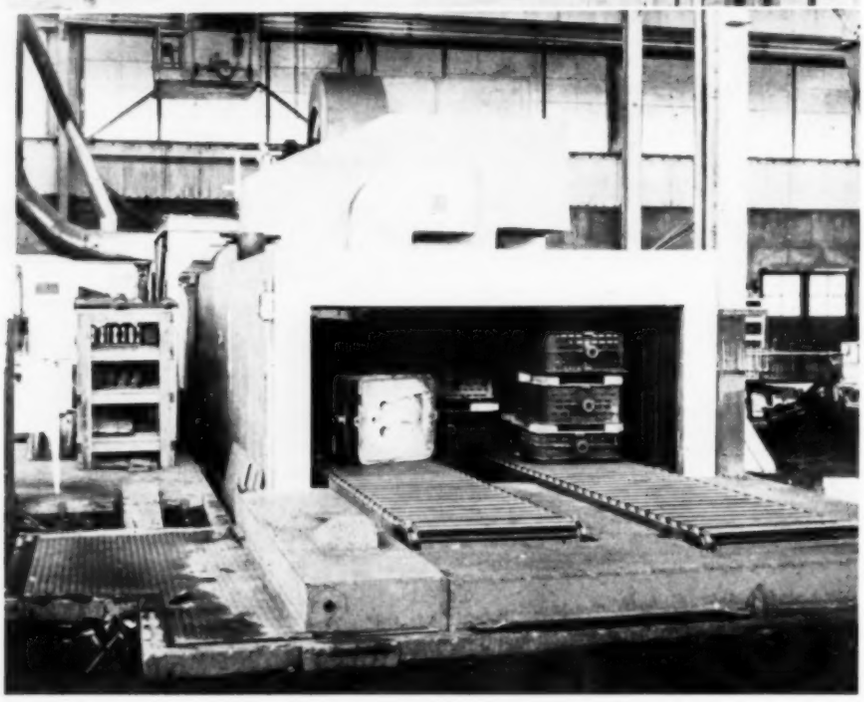


Fig. 10—Partial view of the sand handling system showing the storage bins and the sand mullers. Fig. 11—Molds are dried for 1¼ hours in a specially designed continuous conveyor type oven

Metal Poured Rapidly

Many of the high alloy metal mixtures oxidize easily and develop a heavy surface film or scum upon exposure to the air. Tenacity of this film interferes with the production of smooth castings without wrinkles unless the metal rises rapidly, continuously and uniformly over the vertical mold surface. This means that location and size of the gates are very important factors.

It is not practical to judge closely the temperature of a scum forming metal either by the naked eye or by optical pyrometer. Therefore attempt is made to check the metal temperatures prior to the alloy addition to the bath. Gating arrangements are based on the assumption of uniformity in temperature and fluidity from heat to heat. Gate sizes are regulated carefully to a predetermined cross sectional area to serve as a metering orifice computed according to the size and type of fitting. For example on flanged fittings up to 1000 pounds in weight, the gate has a cross sectional area in square inches equal to 0.09 of the square root of the weight of the casting. Generally the width of the gate is about 2/3 the depth. For ordinary two-hole headers and chunky castings in general the factor drops to a lower figure. On rangy castings that require multiple gates, the factor may be over twice the figure indicated.

Melting practice for all the alloys,

(*Continued on page 74*)

Repeat Orders tell our story!

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DUST SUPPRESSION ENGINEERS

3951 LAWRENCE AVENUE, CHICAGO OFFICES IN PRINCIPAL CITIES

(*Continued from page* 72)

with the exception of the stainless steels, is quite similar to that for ordinary carbon steel in an acid furnace. The charge is made up to contain about 0.30 per cent carbon, with normal manganese and silicon and not over 0.04 per cent sulphur and phosphorus. Metal is melted in an electric furnace made by the Pittsburgh Lectromelt Furnace Corp., Pittsburgh, acid lined, charged through the top and served by an 1800 kilovolt ampere transformer. The high voltage is about 124 across the arc with a phase current of about 4000 amperes. This voltage is maintained until the bath is partly melted and then reduced to about 85 volts with the current stepped up to about 4800 amperes and maintained at that figure until the heat is about melted.

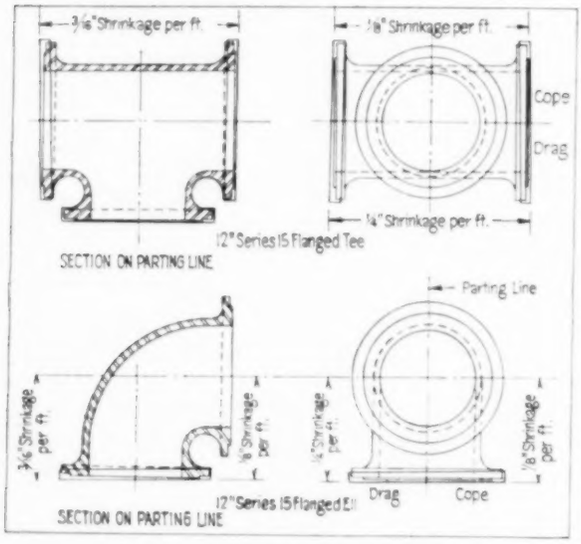

Fig. 12—Distortion is anticipated in the pattern to prevent necessity for excess finish allowance

Sufficient mill scale or iron ore is added during the melt down to insure oxidation of the manganese and particularly the silicon at the lower temperatures. When the heat is boiling vigorously the voltage is reduced to about 60 and the current to about 4000 amperes per phase. This allows for oxidation of the carbon to 0.10 or less without getting temperatures high enough to start fluxing the walls and premature thickening of the slag. Additions of limestone keep the slag from getting too silicious and starting reduction of the silica. As the carbon boil slows down and higher temperatures are reached, the slag tends to thicken and change from a fluid black to a more viscous brown outside, gray-green inside. Fluidity as measured in the slag test designed by Hery drops to 4 or 5 inches. Heat tests indicate proper temperature and fluidity of the metal. Low silicon pig iron is used to stop the boil and bring the carbon up to the desired point. Crushed ferromanganese assists in deoxidizing the slag and reducing the preponderance of free silica. The bath is now nearly quiet. When the reaction from the pig iron is completed the power is cut off.

Ferromanganese followed by aluminum is stirred in, followed by silicon. In an alloy heat the additional alloys are stirred in. Heat tests are taken and the heat is tapped when the temperature drops to the proper point.

After the preliminary deoxidation with pig iron, all heats are finished with the power off to avoid any tendency toward silicon pickup or over reduction, and to give greater uniformity in fluidity and temperature. No deoxidizers are added to the metal in the ladle. If over reduction is suspected a ladle addition of about 5 pounds of mill scale or pulverized ore per ton of metal is made to overcome the condition and give normal fluidity to the metal. This practice has no noticeable tendency to produce pin holes or porosity in the castings.

Pouring practice is based upon close control of tapping temperature. Bottom pouring is practiced exclusively. Better control of pouring speeds and more nearly constant temperature of the metal throughout the heat is thus assured. Nozzle sizes are chosen according to metal composition, effect of fluidity and temperature, size and type of castings. The aim is to pour with a wide open nozzle as much as possible. Nozzles vary in size from 1-inch to 1¾-inch diameter with the 1¼-inch size the most widely used.

(*Concluded on page* 76)

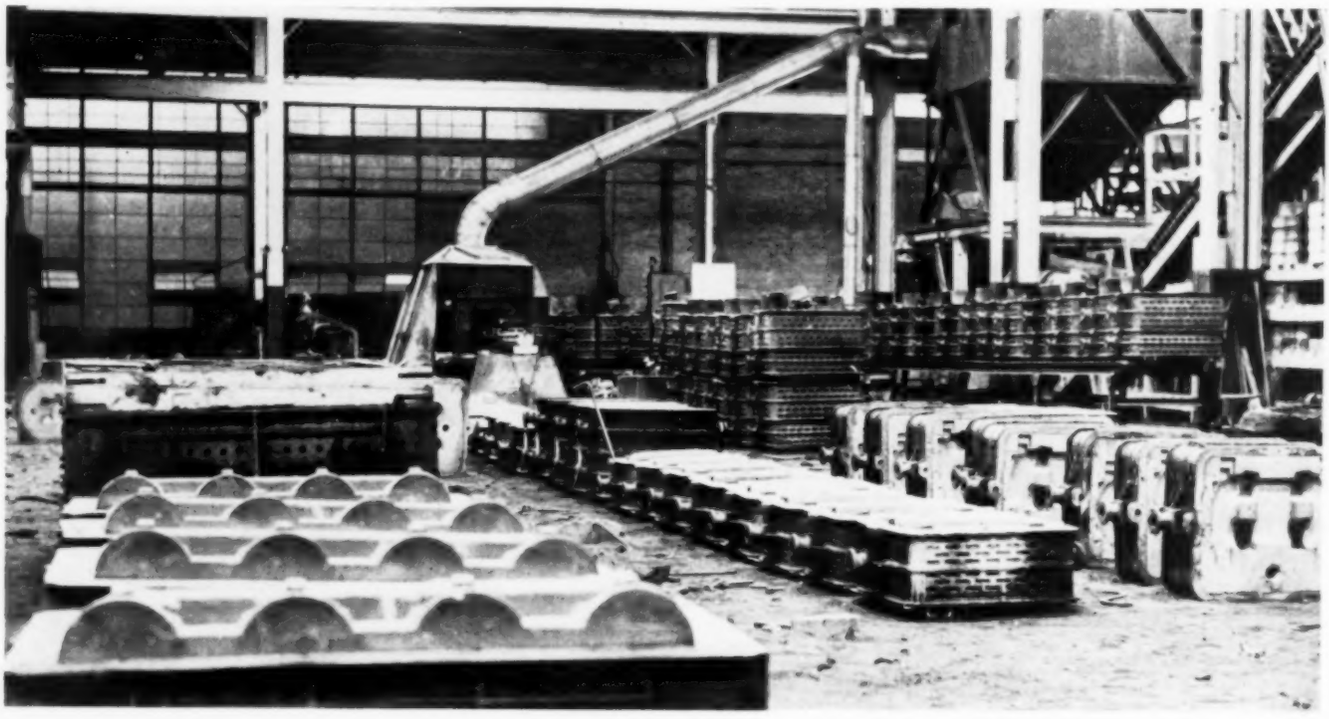

Fig. 13—This view taken at night illustrates the degree of illumination attained with the artificial lighting set-up, and depicts a typical group of molds with cores ready for gaging

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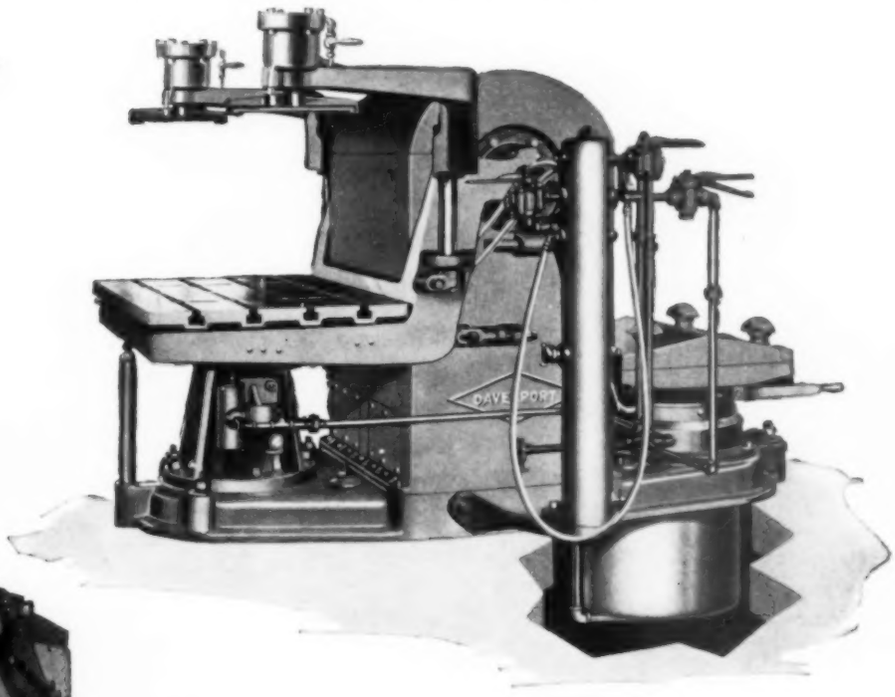

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(*Concluded from page 74*)

Fig. 7 shows a ladle with a 1¾-inch nozzle pouring a 1600-pound casting in which the metal contained 2.25 per cent chromium, 0.50 per cent molybdenum, poured at a temperature of approximately 2925 degrees Fahr. over a period of 38 seconds. With metal temperature and fluidity constant the gate inlet areas are varied according to the jobs. For headers and flanged fittings up to about 600 pounds, metal is poured at the rate of 100 pounds in 3.5 to 4 seconds. Temperature of metal as checked by optical pyrometer is about 2830 degrees Fahr. for carbon steel. The temperature is raised with increasing chromium content up to about 3075 degrees Fahr.

All castings containing chromium are shaken out as close as possible to a temperature of 1000 degrees Fahr. They immediately are sandblasted around the heads and gates and then these parts are burned off. Castings below 600 degrees Fahr. are reheated in the furnace prior to burning. All heavy grinding is performed as soon as possible to avoid grinding checks or cracks.

Castings are heat treated since it is not possible to chip or finish them in the as cast condition. Majority of the castings are given a double normalize and draw treatment. Design and arrangement of the heat treating department are shown in Fig. 9. A single leg gantry crane made by the Whiting Corp., Harvey, Ill., and equipped with a special peal or fork is employed to load and unload the furnaces built by the Philadelphia Drying Machinery Co., Philadelphia. By withdrawing the entire load from the furnace at one time and setting it on the cooling rack, it is believed that much quicker and more uniform cooling is secured than with the car bottom type furnace. Other advantages include flexibility and economy.

The furnaces are equipped with automatic temperature control and fired with natural gas. Hardness of the fittings must be controlled accurately between narrow maximum and minimum limits and satisfactory grain structures must be secured consistently. After heat treatment the castings are reblasted, chipped, finish ground, inspected, and shipped to the machine shop. Hydraulic testing takes place after the castings are machined.

Importance of technical control is realized and emphasized wherever possible. A chemical laboratory is equipped to take care of all necessary tests. Tensile test bars from every heat, and bend test bars when required, are tested in an indicating dial recording machine of 50,000 pounds capacity, equipped to make autographic records of each test. Utilization of modern equipment, the microscope, the spectroscope and the radiograph practically is mandatory in producing fittings for the modern oil refinery. The Key Co., plant has a rated shift capacity of approximately 300 tons per month.

Fig. 14—View of photomicrographic department of laboratory. Equipment includes a specimen cutting-off machine, mounting press, polishing equipment, and microscope supplied and installed by Adolph Buehler, Chicago

Steel Founders Elect New Directors

The newly elected board of directors of Steel Founders' society of America who will serve for the year 1939-1940 are the following: Division No. 1, A. J. McDonald, Lebanon Steel Foundry, Lebanon, Pa.; division No. 2, E. J. Mohr, Symington Gould Corp., Rochester, N. Y.; division 3, Thomas H. Shartle, Texas Electric Steel Casting Co., Houston, Tex.; division No. 4, D. C. Bakewell, Blaw-Knox Co., Pittsburgh; division No. 5, A. H. Anthony, Massillon Steel Casting Co., Massillon, O.; division No. 6, A. K. Reading, Zimmerman Steel Co., Bettendorf, Iowa; division No. 7, Burtner Fleeger, Oklahoma Steel Castings Co., Tulsa, Okla.; division No. 8, J. P. Arnoldy, Warman Steel Casting Co., Los Angeles.

Alternates for the board of directors for the coming year are: Division No. 1, A. M. Andorn, Penn Steel Castings Co., Chester, Pa.; division No. 2, George H. Chisholm, Atlas Steel Casting Co., Buffalo; division No. 3, G. E. Trippe, DeSoto Foundry Inc., Mansfield, La.; J. S. Wardle, Mobile Pulley & Machine Works, Mobile, Ala.; division No. 4, C. L. Snowdon, Reliance Steel Casting Co., Pittsburgh; division No. 5, E. W. Campion, Bonney-Flood Co., Columbus, O.; division No. 6, Carl F. Clarke, Monroe Steel Casting Co., Monroe, Mich.; M. A. Fladoes, Sivyer Steel Casfing Co., Milwaukee; W. L. Beaudway, Allied Steel Casting Co., Chicago; division No. 7, C. L. Harrell, Sterling Steel Casting Co., East St. Louis, Ill.; division No. 8, E. R. Hinton, Olympic Steel Works, Seattle; R. E. Noack, Monarch Foundry & Engineering Corp., Stockton, Calif.

At the organization meeting of the new board held in Cleveland, Jan. 11, Frank M. Robbins, president, Ross-Meehan Foundries, Chattanooga, Tenn., was elected president of the society. Mr. Reading and Mr. McDonald were elected members of the executive committee of which Mr. Robbins is chairman. Col. Merrill G. Baker was reappointed executive vice president; Raymond L. Collier was reappointed secretary-treasurer; and Chauncey Belknap, New York, was reappointed legal counsel. The annual meeting of the society will be held at the Edgewater Beach hotel, Chicago, Feb. 8 and 9.

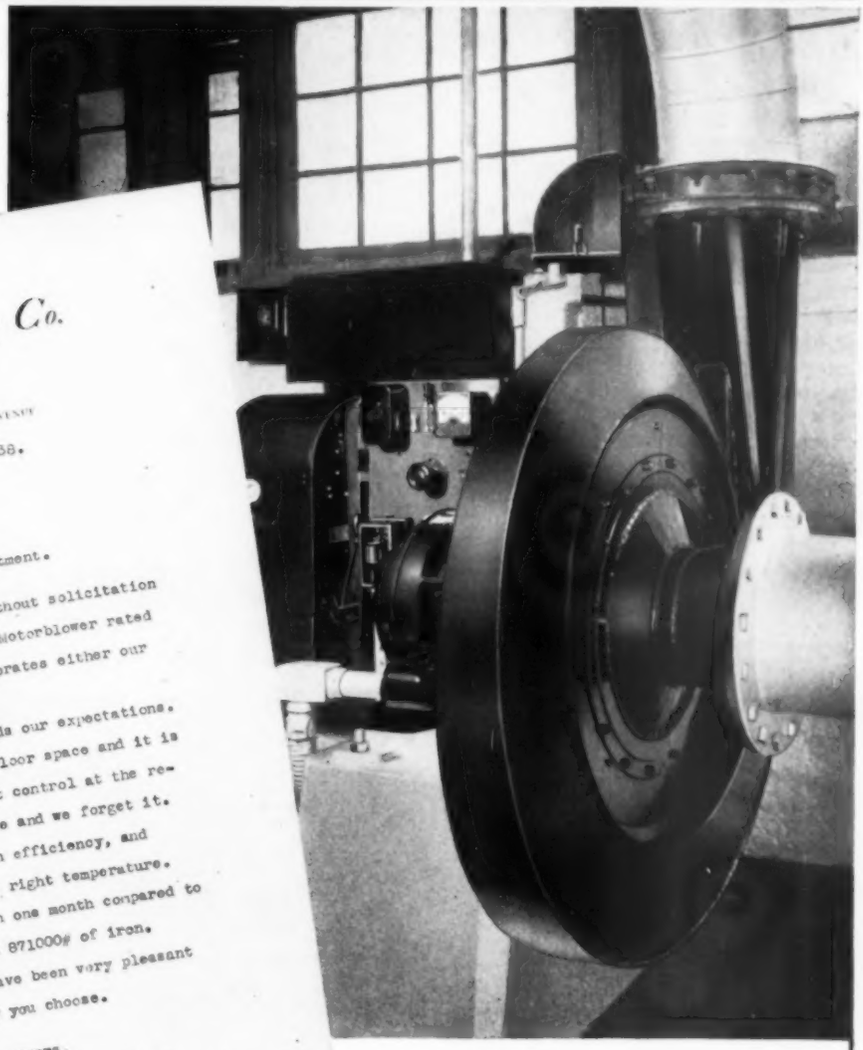
Lecture Available

The Edgar Marburg lecture on "The Torsion Test," delivered by Dr. Albert Sauveur at the 1938 meeting of the American Society for Testing Materials now is available in pamphlet form. The lecture discusses the test, describes the machine, and gives results obtained on various materials under different conditions. Copies of the pamphlet may be obtained from the society, for 35 cents each.

Research Project

Association of Manufacturers of Chilled Car Wheels, 445 North Sacramento boulevard, Chicago, has established a research project at Battelle Memorial institute, Columbus, O., on chilled iron for use in car wheels, according to an announcement of F. H. Hardin, president, Association of Manufacturers of Chilled Car Wheels and Clyde E. Williams, director, Battelle Memorial institute. The work will comprise a critical study of the material in current use and of new compositions in the iron carbon group.

THIS MOTORBLOWER SAVED $644.00 IN COKE IN ONE MONTH



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Castings Established As Valuable Materials

(*Concluded from page* 29)

of America, through its operating group activities, and the American Foundrymen's association, by its regional conference, a separate and distinct effort from the customary annual meeting, have done much to place accurate technical information on castings at the disposal of engineers and students, and the outcome of this will be of obvious benefit in the very near future.

Improved and expanded heat treatments have been a significant factor, and the limiting effect of a reliance on simple annealing is disappearing. Multiple treatments of the normalize and draw, quench and draw types, with differential treatments to produce varying hardness in different areas of the casting, have become commonplace.

Together with the adaptation of flame-hardening practice of steel castings, a treatment to which steel castings are ideally responsive when of correct analysis, this development is opening new fields of application continually.

Improving surface finish is receiving constant attention involving the study of mold-making materials, and other phases of shop practice. In this connection mention should be made of steady improvement and increased application in the use of cement bonded facing materials. Operating under license, foundries using the process have demonstrated its practicability and value.

Industry Writes New Page Of Achievements

By C. R. CULLING

President
Gray Iron Founders' Society Inc.

DURING the past year the gray iron foundry industry has written a new page of achievements in its history. New processes, new methods, better materials and many new applications have developed from these better materials.

In reviewing this progress, I am wondering if we have made and are making the most of our opportunities. Have we perhaps been too modest about our achievements? Have we made known these new and useful facts about gray iron castings? I am afraid that we have failed to present the facts properly.

A long step in that direction is now under way and the following program, sponsored by the Gray Iron Founders' society is in progress:

Battelle Memorial institute is searching the existing literature available in all languages on the engineering properties and performance of cast iron and tabulating it with A. S. T. M. specifications A 48-36 as a control. These data will be surveyed by a special committee of the society and representatives of interested technical societies called in to voice their opinion and make recommendations.

This work at its completion will place in the hands of the foundryman authoritative engineering data concerning the physical performance of his product. Also it will be of inestimable value to the user of cast iron to have definite engineering information available concerning this material.

Emphasis will be placed on these properties exclusive of chemical composition and the dangers involved in assuming that given chemical positions produce given physical specifications will be pointed out. The present program as has been outlined will serve as a guide for future research and development of this most important work so that new data may be added without duplication of effort.

Surely this is a work worthy of the interest and support of every forward thinking foundryman in the industry as its future depends on a unity of effort through the medium of the society.

Cast Steel Metallurgy and Molding Make Advances

By JOHN HOWE HALL

Consultant
Philadelphia

WORK that has been done toward explaining aluminum embrittlement in cast steel and finding at least a partial remedy for it, or rather a means of largely preventing its occurrence, is the outstanding achievement of last year from purely metallurgical grounds. The paper by Sims and Dahle, and the one by Gagnebin, both before the A. F. A., are milestones on the road to the elimination of that vexatious difficulty in the manufacture of steel, especially acid electric steel.

In the line of molding methods, modesty does not forbid me to mention, as the outstanding piece of work I happen to know of, the great development of the Randupson method of molding and the means devised by myself in my work with the Birdsboro Steel Foundry & Machine Co., to eliminate one of the difficulties that has at times beset the process, namely sand burning on. Through that development the difficulty practically has been eliminated. Large savings in cleaning room costs have been made possible, and castings not previously thought possible of economical production in the foundry have been produced successfully.

In numerous cases, large jobs formerly cast with solid sections, to be machined out to finished form at great expense, are now cast to shape with very small finish allowances, and cheaply machined with only a couple of cuts to bring the outlines to finished dimensions.

Problem of Cost Reduction Receives Close Attention

By GARNET P. PHILLIPS

Foundry Metallurgist
International Harvester Co., Chicago

THE casting industry during 1938 gave special attention to the problems of reducing costs with improvement in design and quality of castings. The decline in operating rates gave impetus to the problem of cost reductions. As a result, all materials used, including ferroalloys, were carefully scrutinized to determine the necessity for the continued use of any particular material, and the possibility of the substitution of a less costly material. In the case of ferroalloys this intense study has resulted in a curtailment of the use of specific materials in given cases but results ultimately in determination of the true field of economical application of any given alloy or combination of alloys and thus in the increased use in other cases.

The heat treatment of castings has increased. This includes the treatments for stress relief, for softening and for hardening. The increased use of hardening heat treatments for greater wear resistance has resulted in increased use of alloys.

Melting methods and equipment have received attention to the end of more efficient melting procedure and better control of metal compositions and temperature. Specifically the use of air weight control devices, better metal weighing equipment, mechanical handling and charging and of covered, insulated mixing and transporting ladles has increased.

In addition to the better control of metal composition and temperature obtained are improved working conditions resulting from less arduous manual labor and less exposure of men to high temperatures.

Increased use of mechanical equipment for the handling of molds and molding sands automatically has increased the use of all mechanical molding methods including slinging, jolting and squeezing methods of mold ramming. Mechanical molding methods have not re-

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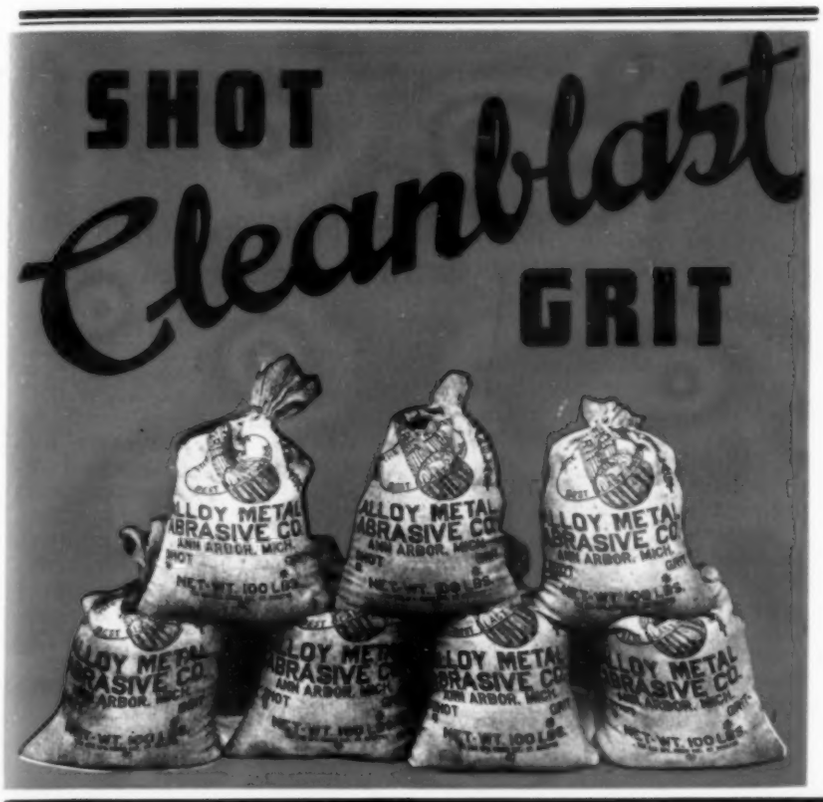

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(*Concluded from page 78*)

sulted in the increased production of which they are capable, in many cases, but have resulted in eliminating most of the hard manual labor involved in hand molding. Similarly the mechanization of foundries makes it vastly easier to control the properties of the sands used, to control dust and in addition to pour molds with suspended or supported ladles.

Blowing of cores has increased giving more economical production of better, more uniform cores with fewer core wires needed. The cleaning of castings by airless shot blasting methods has increased rapidly.

In the laboratories (sand, chemical and physical) new and better types of equipment are being used. This results in more rapid and accurate testing needed for control of raw materials and finished products. The increasing use of the spectrograph for analysis of metals is an example of the newer type of laboratory equipment. Design of castings is being carried on in closer collaboration with foundry supervision with improvement in both production and performance of castings resulting.

The casting industry is making progress in finding new fields of application. An example in the automotive field is the present intensive study being given to cast, pearlitic malleable, surface hardened camshafts.

The future of the casting industry is as bright now as at any time in it's long history.

Nonferrous Casting Field Makes Gradual Change

By N. K. B. PATCH

Secretary
Lumen Bearing Co., Buffalo

IT IS difficult to put one's finger on new developments in the nonferrous casting industry that have to do with the year 1938. Development in this industry has been one of slow, gradual change, without the outstanding incidents that make news. True, the advent of the bronzes with an appreciable nickel content has brought about alloys that meet requirements which heretofore were not so definitely possible. Development of aluminum bronze several years ago, and the increasing understanding of how to produce sound and satisfactory castings from this alloy during recent years have made marked changes in the castings industry. Development of silicon bronzes and other special bronzes to meet corrosion resistance in industrial applications is moving along steadily; but the bronze finally chosen for any particular type of service cannot be named definitely today.

Demand for finer finish in the plated castings brought about a demand for nonferrous casting materials that will take high polishes with a minimum amount of production cost, and these demands are stimulating the investigators to develop just the right alloy. Alloys that are meeting these requirements could hardly be listed here since they vary with the different manufacturers but there is certainly a tendency toward the improvement of all casting alloys so that they meet engineering requirements with more fidelity and a reduction in manufacturing cost wherever possible. Nonferrous alloys of high strength are being manufactured regularly with a definite assurance that they will meet the high test modern engineering requires. In some instances this is brought about by the heat treatment of the castings, a process which is developing rapidly to where it is an exact science. Precise metallurgical control in the manufacturing of these engineering alloys is essential.

Gray Iron Foundry Field Continues Rapid Strides

By HAROLD W. JOHNSON

Engineer
Greenlee Foundry Co., Chicago

THE technique of gray iron foundry practice has continued to make rapid strides during the past year. Use of alloys and processed iron has aided considerably in the development of castings requiring high strength, uniform dense structures and heat resisting properties, and coupled with the fact that gray iron foundries are experiencing closer control both in their cupola practice and chemical analyses, wider applications for gray iron castings as an engineering material can be expected.

Progress Aided by Research Work and Collaboration

By MARSHALL POST

Vice President and Works Manager
Birdsboro Steel Foundry & Machine Co.,
Birdsboro, Pa.

GREAT strides are being made in the art of metal casting—high physicals, sounder metal, closer tolerances, finer finishes; with the result, I believe, that industry as a whole is showing greater interest in the use of castings of all types.

Considerable credit for this advancement is due to the co-operation of foundry suppliers and also of equipment builders.

Research work and collaboration of the technical institutions of America on problems pertinent to our industry is also one of the outstanding aids to our progress.

New processes and technique are being developed that will undoubtedly bring the business of founding to the forefront of our industrial activity.

Developments Should Lead Industry to Prosperity

By W. H. DOERFNER

General Manager
Saginaw Malleable Iron division,
General Motors Corp., Saginaw, Mich.

UNTIL pearlitic malleable iron was introduced into diesel engines that haul the streamlined trains across the continent, servicing pistons was a major problem. Through the use of pearlitic malleable that problem has been almost entirely solved.

Probably the most important step and contribution made by the malleable industry last year was the development and exploitation of pearlitic malleables. Metallurgists and engineers are intrigued with the possibilities of this new high strength material, with the way it responds to heat treatment and its marvelous wearing qualities. We feel that it should lead our industry to greater prosperity in years to come.

Improvement Depends On Technical Development

By W. L. SEELBACH

Secretary and Treasurer
Forest City Foundries Co., Cleveland

DURING 1938 there have been some very important changes in the technical development of foundry production equipment. This technical development has made for improved production facilities, and also for greater improvements in cleaning and handling of gray iron castings.

The writer has not seen any progress in the organization of foundry executives along co-operating lines of business management. There has been some improvement in the association of foundry management in technical problems but not in management and sales problems.

E. J. Woodison Co., Detroit, held a sales meeting at its office and plant on Dec. 29, 30 and 31. Branch managers and salesmen from various cities as well as individuals working out of the Detroit office attended. A special dinner with entertainment features followed the close of the conference. Elton Rogers, general manager, presented an optimistic outlook for future business in general.

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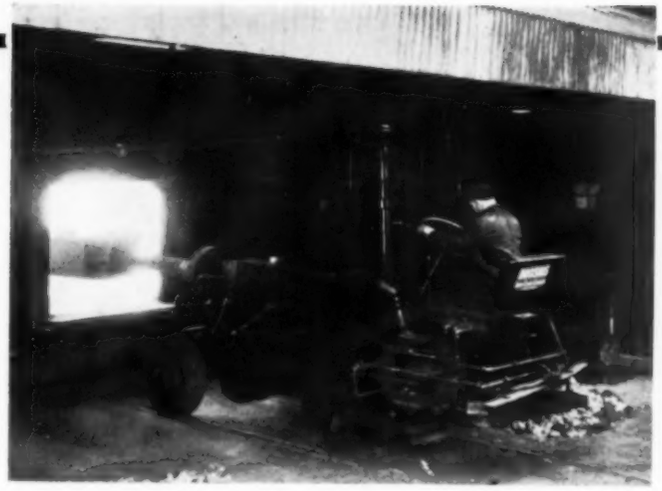
self contained auto floor charging machine, built in capacities from 2,000 to 10,000 pounds



The machine pictured here handles a standard 5′ charging box, but Brosius Auto Chargers are also designed to handle slabs, billets, ingots, etc.; for serving heating furnaces, mills, hammers, presses, etc.; for manipulating pieces under hammers and presses. The Brosius charger is particularly suited for work in congested areas, requires no tracks or special runways, and can turn on its own wheelbase. Because its movement is not restricted to any definite path it is ideal for the smaller open hearth plants, where the expense of installing the usual floor type of machine would be prohibitive.

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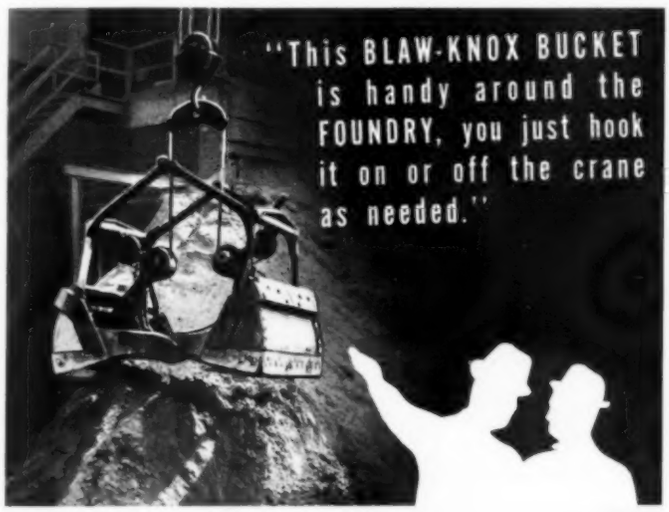

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Old time bell suspended by wire strands from wood beam. To ring the bell the clapper is swung against the side

Bells In Mexico

(*Concluded from page* 31)

After another wild ride, the hero rode into the village and personally presented the bell to the proper authorities. It was mounted in the tower and rings out to this day to the delight and pride of the inhabitants, the honor and glory of the noble benefactor, and as a tangible evidence of the efficacy of prayer—believe it or not!

Many old bells, especially the larger sizes, were cast close to the place in which they were destined to hang. The old native bell makers built a furnace of adobe or brick wherever they decided to cast a bell. Probably employed charcoal for fuel, but on this point I am not certain. The mold was made with a sweep in a pit dug in front of the furnace. Molten metal from the furnace ran through a spout or trough leading from the tap hole to the sprue on top of the mold. I tried to get a picture of an ancient bell-maker, his furnace and a bell recently cast, but a son was suspicious of my motives and would not permit me to take the picture. The art of bell making was guarded closely and the secrets were passed from father to son.

They used any available metal. In many cases this was unrefined copper from the nearest smelter. Copper in this state always carries small amounts of gold and silver and this probably is responsible to a considerable extent for the legend of the quantities of gold and silver coins, jewelry, etc., thrown into the metal before the bells are cast. Some people still believe that the beautiful tones of certain bells are produced in this manner. I have been asked in all sincerity if I put silver in a bell recently cast for Gomez Palacio.

Other wild and of course wholly unauthenticated stories deal with foxy individuals who bought old bells, or traded new bells for the old ones, and realized a fortune from the gold and silver recovered from the old metal. I have had a number of old bells and cast copper kettles assayed. Traces of gold and silver were found, but not in sufficient amount to even pay for the cost of remelting. Analysis of an old bell bearing date 1800 A. D., showed copper, lead, zinc, antimony, a little gold and silver and not a trace of tin. It was rottenly brittle through the presence of 11 per cent arsenic. The metal probably was from a copper mine not far from here in which the metal carries a high percentage of arsenic.

Another custom when a bell is needed, is to collect all the brass and copper junk in the neighborhood. A typical collection sent me one time contained everything from brass beds to Ford radiators, phoney jewelry, obsolete copper coins, counterfeit pesos, copper wire, tin tags, weather vanes, sun dials, window screens, pewter mugs and a large service plate from which age and constant scouring almost had obliterated a very spirited bas-relief rendition of young David whanging a goodly size rock in the general direction of Goliath.

Usually I accept the material and give them credit for the amount, while I put good metal into the bell. Occasionally the stuff is beyond redemption and I refuse to accept it. No one is offended. They take it to a native bell maker who uses everything and guarantees his product. Through the practice, a great number of bells throughout the country either are cracked, or are decidedly unmusical in tone. However, in all justice it must be admitted that many of the bells compare favorably in tone with bells made elsewhere and have been in constant use for many, many years.

To apply on an order for a new bell, an institution sent me a collection of old bells including one that had been used on a clock. Analysis of this bell showed a lead content of 22 per cent. The padre told me that when he had complained of the tone of this bell he had been told by the maker that the tone originally had been of the best, in fact superb, but that it had been spoiled by boring some holes in the top to hang it. The metal contained some silver, a little gold, but practically no tin. I used the metal in a mixture poured into ornamental lamp castings.

Mounted in Modern Manner

The bell shown in Fig. 1, decorated for the consecration ceremony, recently was installed in the Gomez Palacio cathedral and was used for the first time at the inauguration of the eucharistic congress. This bell weighs 550 pounds, copper 81 per cent and tin 19 per cent. It is mounted on ball bearings, well balanced and turns with a very light touch. The yoke and wheel are brass and the pedestals are cast iron. The wheel is grooved for a rope to be pulled from below, but the native bell ringers do not favor the use of a rope. They like to spin the bell. A ringer starts his call for mass or the angelus or other service by giving the bell a good start which will keep it revolving for several minutes. Then he rings two other bells.

We mold the bells in flasks from a two-part pattern as shown in Figs. 2 and 3. The upper part of the pattern serves as a corebox in which to make a dry sand core later placed on top of the green sand core left by the pattern. Letters to form the inscription are lead easily bent to follow the contour of the bell and held temporarily in place by small nails. As the ramming of the mold progresses these nails are removed and the letters come away with the cheek when it is stripped from the pattern. Inside and outside of the mold are black washed and skin dried. In the majority of cases the sprues are placed on the curve of the crown. Fig. 4 shows an experimental gating method which served satisfactorily on an 1100-pound bell. This picture also shows the crew who made the bell, all bright young fellows and competent mechanics. The man at the right is my head molder.

Operates Foundry

H. H. MILLER, proprietor, Miller Bronze Foundry, Torreon, Coahuila, Mexico, was born in Illinois. While still a youth the lure of adventure carried him over the greater part of the South and Southwest and parts of Mexico. About 20 years ago through a combination of circumstances he found himself the proprietor of a jobbing brass foundry and has operated it steadily up to the present. Although not posing as a bell specialist, he has cast a considerable number of bells for churches and other establishments north and south of the Rio Grande. Other products include highly artistic lamps, altar rails and pulpits. At the Milwaukee convention of the A.F.A., 1924 he presented an interesting paper on Mexican foundry methods and technique. A biographical sketch of Mr. Miller appeared in the Dec. 1, 1929 issue of The Foundry. The Editors

MANHATTAN ABRASIVE WHEELS

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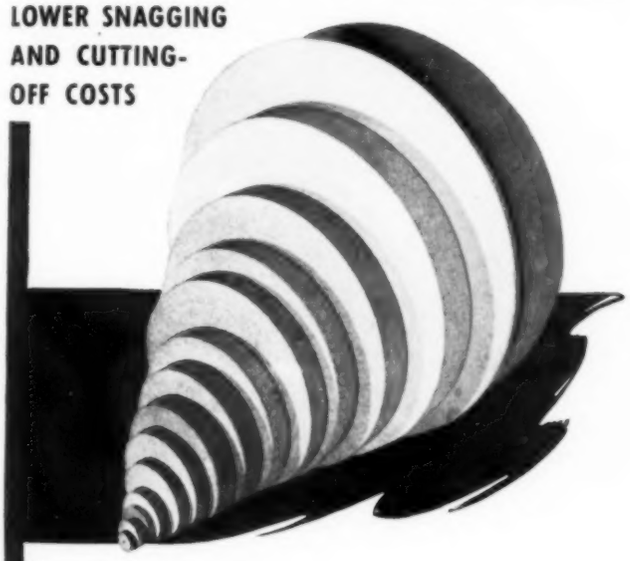

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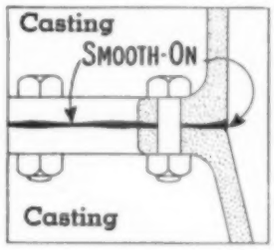

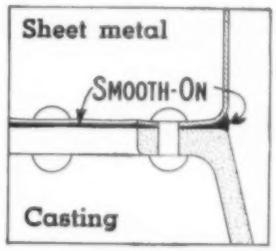

HERE is a tip that can help you or your customers:- Smooth-On No. 6, a gray iron putty that comes ready for use and remains semi-plastic in service, is unequalled for joints between castings or between castings and sheet metal, where warped surfaces do not meet perfectly and where a permanent seal is desired.

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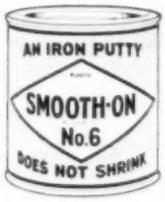

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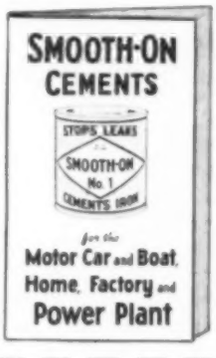

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Reader's Comment

EDITOR'S NOTE — *Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of The Foundry or of Its Editors.*

Pour Casting

TO THE EDITORS:

On page 36, questions and answers in the December issue of THE FOUNDRY regarding shrinkage in bore of gray iron hub casting 8⅝ inches high, 8⅜ inches diameter at center and 5¼ inch diameter at top and bottom, 1½ inch core. The proper way to make this casting is as follows: Pour the casting from the top using pencil gates about ⅜-inch diameter. You require no riser. The reason for the shrink in the bore is not lack of riser, but it is caused by the gate which delivers the hot metal in the center of the casting.

The proper way to pour any casting is to get the hot metal on the top of the casting following a system of progressive cooling.

FRANK M. MEYERS

301 *North Linn Street*
Bay City, Mich.

Anniversary

TO THE EDITORS:

As an old subscriber to THE FOUNDRY, we have the pleasure of sending you a cast iron plaque which was made by us on occasion of the 50th anniversary of the founding of our company. You

can make use of it in a notice in THE FOUNDRY.

HEKKENS' IJZERGIETERIJ

Tegelen, Holland

EDITOR'S NOTE: The illustration above is a reproduction of a splendid piece of artistic work in cast iron. Congratulations to Hekkens' Ijzergieterij.

Solves Troubles

TO THE EDITORS:

In the January, 1939, issue of THE FOUNDRY, I notice where someone is having trouble with packing material of 50 per cent copper and 50 per cent lead. Our organization experienced the same trouble in manufacturing packing for superheated steam and air compressors until virgin copper and virgin lead, absolutely free from arsenic were purchased. The metal was melted as described in your January issue.

If this will do anyone good, we are glad to pass it on, as we had years of difficulty with that particular mix.

C. A. JOHNS

Galt, Ont.

Purpose of Review

TO THE EDITORS:

On page 68 of the January issue of THE FOUNDRY there is a review of the *Creep Data* book. I don't know just what your policy is in such reviews.

You quite properly stress salesmindedness on the part of foundrymen in your excellent editorials. To market a product intelligently it is necessary to know its properties and possibilities. As you know temperatures and pressures are being stepped up, not alone in the power and oil fields, but also in some of the process industries and in the marine field. Among properties of decided interest to designing engineers is creep. Data was widely scattered. The assembly in the book represents several hundred thousands dollars worth of test work by some of the country's finest research organizations, assembled and arranged in a standard form at considerable expense to the committee. The price of the book does not cover the cost of printing it in a limited edition and the committee has appropriated a tidy sum to underwrite it.

Castings compete with forgings and welded assemblies in high temperature services. Castings in some cases have much to offer in creep characteristics, and to get their share of business, foundrymen should learn what they have to offer. In some cases—notably nonferrous alloys, copper base—creep information is limited—and this is one reason why regulatory bodies have knocked down ratings—for these alloys. Cast iron has lost considerable tonnage too.

I feel that any steel or copper-base alloy foundryman who is making a quality product of possible application in the field under discussion should have the book, and study it carefully, if he is a believer in the sound policies expressed in your editorials. The purpose of a book review, I believe, is to reveal to the reader the possible usefulness of the book to him and in this sense a review is a service to the reader. Some reviews criticize details, some go so far as to recommend or to damn the book. The point at issue is whether or not your readers' interests would have been better served by giving them some idea as to the real purpose, scope and possible significance to them of the book.

JOHN W. BOLTON

Lunkenheimer Co.
Cincinnati

Drink Up!

TO THE EDITORS:

Every person probably is familiar with the old saying about the ease of leading a horse to the watering trough, but the utter impossibility of making the animal drink unless he or she is so inclined. You are putting out a very good, interesting and valuable magazine, but I doubt whether it is read by many molders or foremen. You tell the foundrymen what you have to offer, but you do not tell them what opportunities they are missing.

In February, 1919, I resigned as foundry superintendent of a large architectural bronze foundry. Three highly competent molders were in line for the position, but they were afraid to apply for it. They never had read THE FOUNDRY.

While I was foundry superintendent for a large manganese bronze foundry company I received an offer to take charge of an important iron foundry in the middle west. The position I had at the time was satisfactory in every respect and I declined the offer. I had two good iron molders working for me and I suggested to each one that he should apply for the position I offered to get in touch with the firm and recommend them highly, but they refused to consider the proposition. They were competent mechanics, but knew nothing of iron mixtures or cupola operation. They were just molders and did not even know that such a magazine as THE FOUNDRY was in existence.

Every issue of THE FOUNDRY contains interesting material. Some issues contain information worth hundreds of dollars. (Believe it or not).

AUGUST M. ROTH

Roth Foundry
New York.

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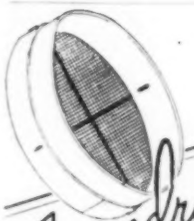

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CINCINNATI, OHIO, U.S.A.

European Foundry Practice

Digest of Recent Literature Covering Various Phases of Castings Manufacture

Chemical Industry

Durability of Cast Iron Kettles for the Chemical Industry (Ueber die Haltbarkeit gusseiserner Kessel fuer die chemische Industrie), by Alfred Giessel, *Die Giesserei*, Dusseldorf, Germany, Nov. 4, 1938.

To supply suitable products for the chemical industry the foundryman should know in the case of acid resistance: Nature of the chemical substance, concentration as well as concentration displacement during the process, highest and lowest temperature of material in the kettle, frequency of temperature changes between those limits, and method of heating (indirect, direct, or gas heating with ring-form special burners, etc.)

For alkali resistance he should know: Nature of the chemical substance. Whether a water-free melt or a watery solution is to be handled, whether a hardened deposit occurs, highest and lowest temperatures of material in kettle, frequency of temperature changes between those limits, method of heating kettle, whether localized overheating of bottom or walls can take place, and whether kettle is heated to incandescence.

The author discusses various phases of those points, and then turns to compositions and structures. In his opinion the structure is second to chemical composition, and shows that with increase of combined carbon a much longer life can be secured. A number of compositions are mentioned including one for soda kettles containing 3 per cent carbon, 1.85 per cent silicon, 0.2 per cent manganese, 0.2 per cent phosphorus, and 0.045 per cent sulphur. One for soda pans contains 3.6 per cent carbon, 1.5 per cent silicon, 0.4 per cent manganese, 0.1 per cent phosphorus, and 0.08 per cent sulphur.

He stresses high pouring temperatures giving figures which show a much greater life for kettles poured hot. He also mentions the value of casting skin for resisting corrosion. Use of alloys improves durability of chemical kettles. For acid resistance nickel and chromium additions are recommended, while for alkali resistance nickel additions from 0.27 to 2 per cent are suggested. According to the author the most useful addition is 0.5 per cent nickel.

Casting Properties

Casting Properties of Metal and Particularly of Cast Iron (Les Proprietes de Fonderie du Metal et de la Fonte en particulier. Consequences Pratiques.), by M. Dudouet, *Bulletin*, Association Technique de Fonderie, Paris, France.

Defects in castings ordinarily are divided into two groups: Those due to lack of certain mechanical properties such as shearing, bending, hardness, torsion, etc., and those defects which affect the casting itself such as gas pockets, pipes, cracks, etc. In a general way defects of the first group are attributable to the quality of the metal, and those of the second group to molding and design of the casting. This is an extremely simple method of distinction which does not take into consideration all of the factors which contribute toward producing such defects.

Just as incorrect molding procedure may impair the mechanical properties, defective castings also may originate from the nature of the metal itself; known as its casting properties. The particular phenomena referred to under casting properties are: Pourability, piping, shrinkage cracks, cracks developing at low temperatures as the result of internal stresses, and gas pockets. Each of those are discussed at length with their practical consequences. Influence of chemical composition of the cast iron containing the usual elements (carbon, silicon, sulphur, phosphorus) on the casting properties is dealt with in detail. Brief reference also is made to the cupola which although simple in appearance, puts into play complex phenomena requiring careful study.

Cupola Operation

Cupola Operation (Il funzionamento del cubilotto), by Marcel Dudouet, *La Fonderia*, Turin, Italy, October, 1938.

The author discusses cupola operation from the theoretical as well as the practical standpoint. Since the combustion phenomena in the cupola affect more or less deeply the intrinsic value of the castings, the reactions occurring therein which affect the composition of the iron during, and after melting are discussed in detail. On the practical side the author takes up the design of the cupola, location of the tuyeres, operation, etc. Hints also are given for avoiding and remedying some of the difficulties developing during cupola operation.

Iron Recovery

Reclaiming Iron from Foundry Waste (Wiedergewinnung des Eisens aus dem Giessereischutt), by U. Lohse, *Die Giesserei*, Duesseldorf, Germany, Sept. 23, 1938.

A newly developed machine to reclaim iron from foundry waste is described. It is a self-contained unit mounted on wheels, and in appearance resembles a well-known American unit for sand conditioning. Lower part of the machine contains a 3-horsepower motor for driving a short horizontal belt, rotating the magnetic drum, and driving a direct-current generator. Traveling belt is mounted at approximately 20 degrees from the horizontal, and is surmounted by a coarse grid or grating to insure removal of large material.

Magnetic drum is located at upper end of traveling belt with just sufficient space between to permit stones, pieces of coke, etc., to drop through to a discharge trough. Iron in the material is attracted to the magnetic drum, and carried up and over to the other side where it is removed by a scraper. The drum travels about 40 revolutions per minute. With a belt about 12 inches wide, it is claimed that approximately 5¼ cubic yards of foundry waste can be handled. While the machine has handles like a wheelbarrow, and is mounted on large wheels, its portability by manpower is doubtful since it weighs 1200 pounds.

High Test Iron

Meehanite Iron—A Metal of Unusual Properties, by A. M. Ondreyco, *The Australasian Engineer*, Sydney, Australia, Nov. 7, 1938.

According to the author physical and mechanical properties developed in meehanite are far superior to those generally expected from a cast iron. It is made to produce certain definite microstructures in the finished product. Through the mechanics of the process excess carbides are broken down and there is a precipitation of finely divided graphite in a pearlitic or sorbo-pearlitic matrix. Method of melting is under metallurgical control. Basic materials are selected so that the final product will meet definite and rigid specification according to service conditions. Every ladle of molten metal is tested before it is poured, and if necessary the liquid metal can be modified before casting.

Uniformity of structure in heavy section is indicated in a 12 x 12 x 12-inch block which showed only a variation in brinell from 174 in the center to 187 at the edge. Tensile strengths of 22.5 tons (50,400 pounds) per square inch, are guaranteed while with heat treatment or alloying up to 33.5 tons (75,000 pounds) per square inch can be obtained. Meehanite castings are susceptible to hardening and tempering in the same manner as steel. Castings annealed, quenched in oil or water, and tempered are finding extensive applications.

Powder Metallurgy

Powder Metallurgy of Iron with Particular Reference to Pacteron, by W. D. Jones, *Foundry Trade Journal*, London, England, Dec. 1, 1938.

Carbonyl iron powder employed in powder metallurgy is a high cost material, and after a search a substitute material called Pacteron was developed for that purpose. It is patented and made from steel grit used for shot blasting. Its composition is about 3.16 per cent carbon, 1.13 per cent silicon, 0.58 per cent manganese, 0.126 per cent sulphur, and 1.154 per cent phosphorus. That material was placed in an alloy steel die and subjected to a pressure of 8 tons (18,000 pounds) per square inch. It was then inserted in a muffle furnace while still in the die, and subjected to various temperatures.

Pressings subjected to 400 degrees Cent. could be handled, and a gradual increase in strength was obtained with increasing temperatures until at 800 degrees Cent. a tensile strength of 2 to 3 tons (4480 to 6720 pounds) per square inch was obtained. At 975 degrees Cent. the pressed material showed a tensile strength of 35 to 36 tons (78,400 to 80,640 pounds) per square inch, density of 7.0 to 7.1 and brinell hardness from 260 to 270. Microstructure shows ferrite, phosphide eutectic, nodules of temper carbon, and pearlite areas. Grain size is fine, and temper carbon nodules are small compared to those customarily found in malleable castings.

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Weighs less BUT covers more.
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Reduces metal and sand fusion.
Does not contaminate molding sands.
Particles are spherical and pass a 200-mesh screen.

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It insures better castings. It saves money and molds.
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Balance *Moisture Teller* *Sand Rammer*

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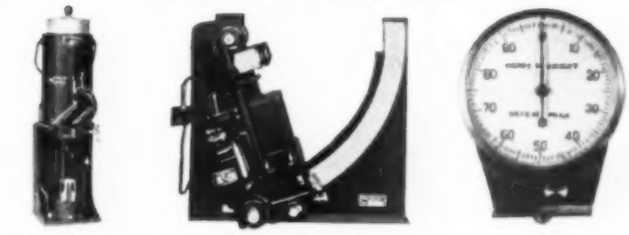
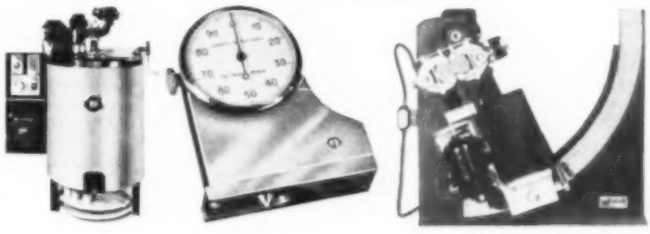
PERMEABILITY — STRENGTH — MOLD HARDNESS TEST



Permeability Meter *Universal Sand Strength Machine* *Mold Hardness*

Control your molding sand and molds to secure better castings at a lower cost.

CORE TEST



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OBITUARY

CHARLES N. RING, widely known in the steel foundry industry over a period of many years died at his home in Chicago Jan. 21. Mr. Ring began his career in the foundry business in 1900 when he worked during the vacation period with Shickle, Howard & Harrison, East St. Louis, Ill. He was graduated from the University of Missouri in 1904 and practiced law in St. Louis until 1908 when he entered the laboratory of the American Steel Foundries, East St. Louis, Ill. In 1913 he became chief chemist and metallurgist, Alton Steel Foundry, but resigned that position to join the Illinois Steel Co., Gary, Ind. Later he returned to Alton as chief chemist and metallurgist for the Laclede Steel Co. He held a similar position with the Ohio Steel Foundry, Springfield, O., from 1918 to 1923 and was manager of the Atlas Steel Castings Co., West Harvey, Ill., from 1923 to 1925. In the latter year he was appointed assistant director of the Electric Steel Founders Research group. For the past several years he has been connected with the Chicago public schools.

* * *

B. Pennell Leddick, 52, junior partner, Harvey Foundry Pattern & Machine Co., died recently in Detroit.

* * *

George A. Ruff, 41, employed by American Steel Foundries Co., Alliance, O., died at his home in that city Dec. 29.

* * *

Frank F. Jackson, 44, vice president and treasurer, Standard Alloy Co., Cleveland, died Jan. 3 while vacationing in Florida.

* * *

John F. Madigan, 73, superintendent, Farnam Brass Works Co., Cleveland, until he retired in 1930, died Jan. 2 at his home in Lakewood, O.

* * *

Joseph H. Lee, 83, who until his retirement 18 years ago, headed the Providence Brass & Aluminum Foundry, Providence, R. I., died recently in his home in that city.

* * *

A. V. Hunter, New York manager of the Werner G. Smith Co. division of Archer-Daniels-Midland Co., Cleveland, died Dec. 24 after a short illness.

* * *

Guy B. Fulton, vice president, Fry-Fulton Lumber Co., died recently at his home in St. Louis. Mr. Fulton was born at Cairo, Ill., and educated at Dubuque, Iowa. He became associated with the Charles F. Luehrmann Hardwood Lumber Co., St. Louis, in 1893, later becoming general manager of sales of that company. In 1929 he and Thomas W. Fry took over the business and reorganized it as the Fry-Fulton Lumber Co. At the time of his death, Mr. Fulton was also president of Pioneer Lumber Co., Jackson, Miss.

* * *

P. J. Ward, who had been works manager, American Steel Foundries, East St. Louis, Ill., for over 34 years, died at his home in that city on Jan. 10. He was 66 years old. Mr. Ward was born in St. Charles, Mo., and

P. J. Ward

had been associated with the foundry industry for over 50 years, starting in the iron foundry of the Wabash railway at Moberly, Mo. He became affiliated with the Shickle, Howard & Harrison Iron Works, which later became a part of the American Steel Foundries in 1897, and continued with the latter until his retirement on account of ill health, on Jan. 1, 1939. He worked as a molder, foreman, and shop superintendent before taking the position as works manager in 1904.

* * *

Arthur M. Mattison, 57, president, Mattison Machine Works, Rockford, Ill., died Dec. 21. He had been president of the Mattison firm since the death of his father, founder of the company.

* * *

Whitman Wilson Bowers, 62, who was associated with the Scovill Mfg. Co., Waterbury, Conn., for 40 years and was assistant secretary when he retired in 1936, died Dec. 30 at his home in South Egremont, Mass.

* * *

George E. Scott, 65, president, American Steel Foundries, Chicago, died recently at Rochester, Minn., where he had gone for treatment for a throat ailment. Mr. Scott was born in St. Louis where he started his business career with Simmons Hardware Co. In 1901 he went to Chicago as vice president of the Simplex Railway Appliance Co., later acquired by American Steel Foundries. He was vice president of American Steel Foundries from 1905 until he was elected president of the firm in 1929. During the war Mr. Scott was general manager and member of the American Red Cross war council.

* * *

William B. Swift, 69, retired purchasing agent, International Harvester Co., Chicago, died Dec. 20. Mr. Swift had been with the Harvester company 42 years.

* * *

Harold W. Anderson, 59, vice president, Anderson Bros. Brass Foundry, Chicago, died Jan. 11 at his home in that city. The foundry with which he had been associated for 39 years was one of the first in Chicago.

* * *

Robert J. Shefferly, 60, president, Quality Foundry & Mfg. Co., Los Angeles, died at his home in that city on Jan. 2. Mr. Shefferly was born in Mount Clemens, Mich., and was an alumnus of Detroit college and Rose Polytechnic institute, Terre Haute, Ind.

* * *

Frederick A. Ingalls, 82, prominent for many years in Chicago industrial circles, died at Pebble Beach, Calif., Dec. 12. He formerly was president, Buda Foundry & Mfg. Co. and the Ingalls Shepard Forging Co., and was vice president, Wyman-Gordon Co., Worcester, Mass.

* * *

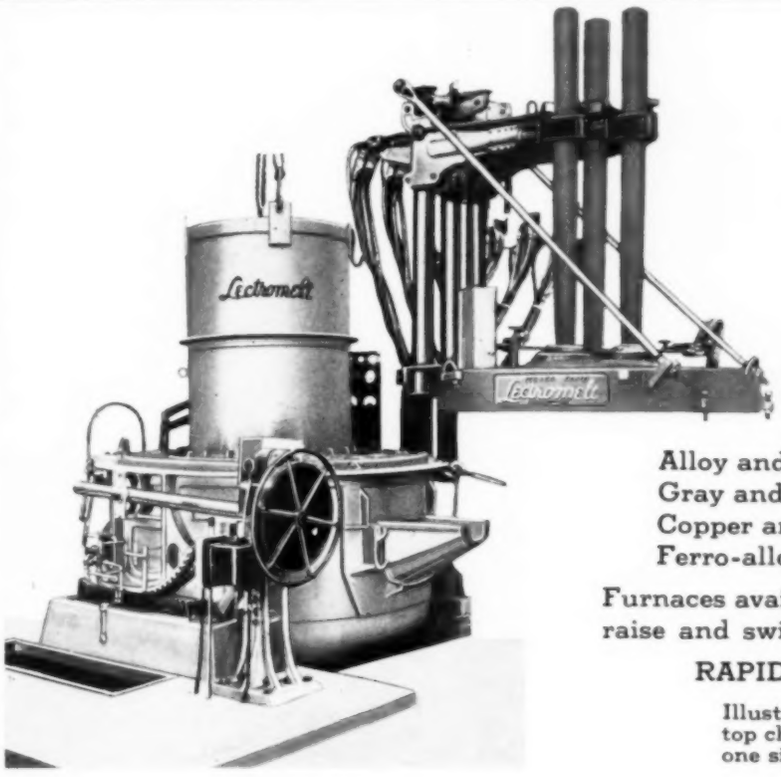
Michael Riesner, consulting engineer, Worthington Pump & Machinery Corp., Harrison, N. J., died at his home in Buffalo, on Dec. 12. He had been associated with the firm since 1892, and was chief engineer of its Cincinnati works for 20 years.

* * *

Fred W. Ficht, 81, founder and president, Leader Brass Foundry & Mfg. Co., Cleveland, died Jan. 10. Mr. Ficht went to Cleveland from Germany in 1881 and was one of the founders and first president of Brookside Brass & Mfg. Co. In 1913 he sold his interest and established the company of which he was president at his death.

* * *

Charles A. Akers, 80, former plant superintendent, Eberhard Mfg. Co., Cleveland, division of Eastern Malleable Iron Co., died Dec. 25. Mr. Akers came to Cleveland 70 years ago from North Royalton, O., and had been plant superintendent for the Eberhard company 43 years. He retired 10 years ago.



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Furnaces available in top-charge type with quick raise and swing roof—also in door-charge types.

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Illustration shows new LECTROMELT top charge furnace with roof rotated to one side and charging bucket in place.

PITTSBURGH LECTROMELT FURNACE CORP.

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Use TIECO foundry ladles and you use the best ladles that money will buy! *Made in all types and sizes* for more efficient, profitable foundry production. Day in and day out in foundries all over the country, TIECO foundry ladles are proving their worth. It will pay you to write today for descriptive literature.

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THE INDUSTRIAL EQUIPMENT CO.

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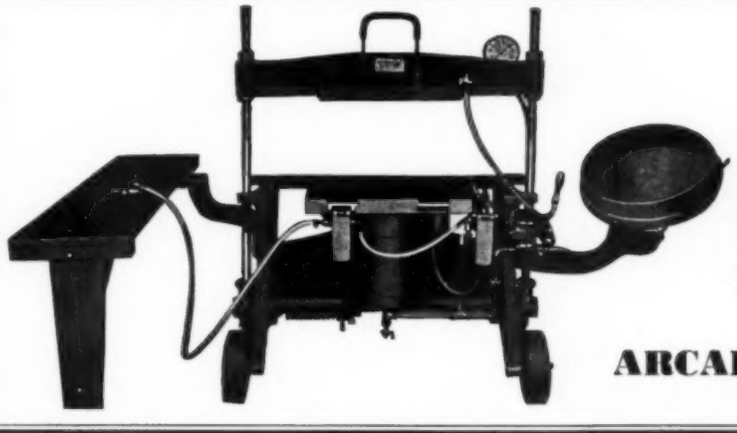


DEPENDABLE JOLT SQUEEZERS

	No. 81	No. 91	No. 101
Jolt Cyl.	3"	4"	5"
Squeeze Cyl.	8½"	10"	13"
Between Uprights	32"	36"	38"

ARCADE MANUFACTURING CO.

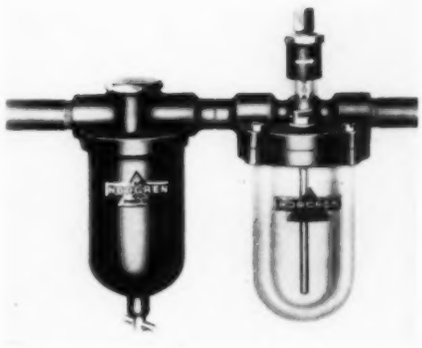
Freeport, Illinois

Air Filter

C. A. Norgren Co. Inc., Denver, Colo., recently has developed a combination of two new devices, shown in the accompanying illustration, designed to condition air for efficient operation of pneumatic tools. The strainer, shown at the left, is made up of a double screen, bronze head and a drawn steel tin dipped bowl. A 200-mesh monel metal screen is supported by a 100-mesh brass screen. Effective straining area is five times greater than inlet and outlet openings with no restriction of air flow or pressure drop. Screen element easily is removed for cleaning by unscrewing the top. Sump may be blown out by turning *T*-handle valve at the bottom. The strainer removes dirt, scale and other impurities from the air stream and it is claimed traps approximately 92 per cent of the moisture. The new model is offered in ¼ and ⅜-inch sizes.

The new lubricator shown at the right follows in general the design of the regular Norgren lubricators with the added feature of a transparent oil reservoir of resilient plastic.

The oil feed is controlled by a simply adjusted needle valve, in plain sight, revealing the exact amount of lubricant being introduced to the air stream. Filler plug in reservoir makes refilling easy. Even with the air line in use, new lubricant may be added without blow back or spray. The new design is available in ¼, ⅜ and ½-inch sizes for horizontal lines.



Combination strainer and lubricator delivers clean air to pneumatic tools

• One Shepard Niles electric monorail hoist gives "express service", indoors or out to any point in the plant or yard carrying loads of every description. Furnished with single or double hooks in capacities from ½ to 10 tons.

They are also ideally suited to the accurate control of any standard electromagnet or grab bucket.

Write for catalogs illustrating and describing the "Aerial Railway of Industry".

Shepard Track consisting of two special analysis T-rails clamped to the bottom flange of a standard I-beam insures a smooth, hard, long-wearing track for monorail hoists.

A COMPLETE LINE OF CRANES & HOISTS

SHEPARD NILES CRANE & HOIST CORP.

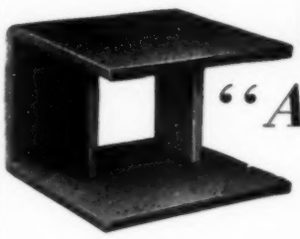
360 SCHUYLER AVENUE . . . MONTOUR FALLS, N. Y.

Control Atmosphere

Surface Combustion Corp., Toledo, O., has designed a new type of controlled atmosphere furnace for heat treating molybdenum alloy, high speed, and carbon steels without decarburization. The controlled atmosphere used in the furnace, which is shown in the accompanying illustration, was developed especially for treating molybdenum high speed steel without a protective coating such as borax. It is said, however, that the atmosphere is ideal for treating all types of steel used in the manufacture of tools, dies, and wearing parts which require a nonoxidizing and nondecarburizing atmosphere for heat treatment. Atmosphere in the furnace is produced from a carbonaceous material such as charcoal and an oxidizing

(*Continued on page* 92)

Unit for supplying controlled atmosphere is integral with the furnace



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"MEET" the new addition to our line, and a fit companion to the famous MILWAUKEE THREAD STEM Single and Double Head Chaplets.

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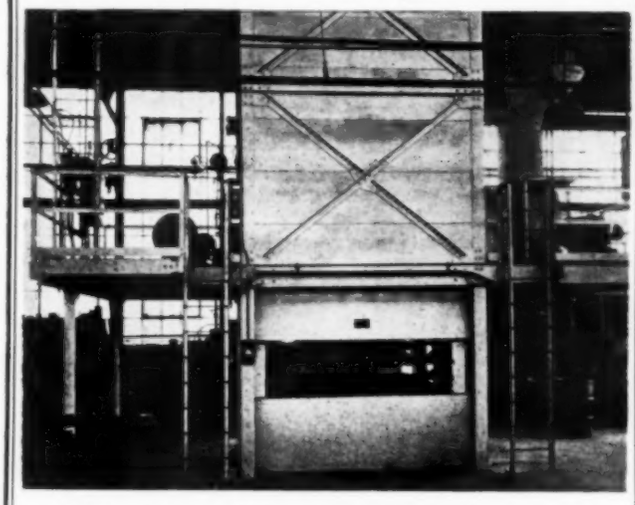

Oil Fired Vertical Oven—Patent Pending, built for a General Motors Subsidiary

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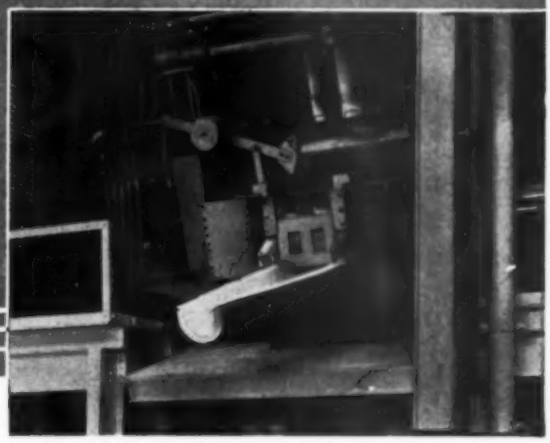

TYPE 1½ *Heroult Electric Furnace showing floor tilting, copper tubing, and wedge type electrode holders.*

FOUR major innovations make Heroult Electric Furnaces more efficient than ever —

Floor attached to shell tilts with furnace.

Water-cooled copper tubing, with suitable separation from mast arms, carries current to electrodes to prevent hysteresis and eddy current losses.

Improved wedge type electrode holders.

Lightweight welded roof coolers.

Heroult Electric Furnaces have gained a remarkable reputation for efficient melting and refining of all kinds of ferrous materials by basic or acid process—including alloy, tool and forging steels, iron and steel castings. Any capacity from ½ ton to 100 tons; removable roof, chute, machine or hand charging.

AMERICAN BRIDGE COMPANY

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Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

(*Continued from page* 90)

base gas such as air, in a self-contained generator integral with the furnace. Essentially it is a mixture of balanced carbon oxides largely diluted with inert nitrogen. The furnace is being supplied in two types—a horizontal muffle type and a vertical muffle type—and in temperature ranges of 1400-1850 degrees Fahr., and 2000-2400 degrees Fahr. A variety of muffle sizes are available in both types.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has developed a new copper alloy containing chromium and silver which has interesting properties.

Hand Torch

Johnson Mfg. Co., 2825 East Hennepin avenue, Minneapolis, has introduced a small oil burning hand torch designed for such operations as skin drying of molds, preheating of castings prior to welding, preheating of steel sections for bending and straightening, etc.

The torch requires no warm up and it is claimed that no oil will drip into the mold. The unit has been designed especially to prevent clogging and therefore can run continuously without variation of flame. The torch may be tipped to quite an angle with no danger of oil pouring out of the nozzle.

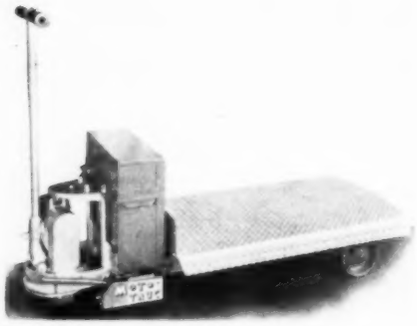
The torch is available in 2-quart and 1-gallon capacity and requires from 3 to 5 cubic feet per minute of compressed air.

No warm-up period is required in operating the torch

Lift Truck

Moto-Truc Co., 6536 Carnegie avenue, Cleveland, has introduced a light, electric powered lift truck designed for handling 2-ton loads. The average weight of the unit with battery is 570 pounds. It is claimed that the truck can be maneuvered easily from all angles, working in close quarters.

The lifting frame in the low position may be secured in 6, 7, 9 and 11-inch heights. Lengths of the frame vary according to requirements from 30 to 72 inches and the width from 19 to 26½ inches. The forward or reverse drive is controlled by the roller handle and the unit is steered manually. Its braking is secured through reversing the current.



Light, electric-powered lift truck designed for handling 2-ton loads

Bevel Gear

Condenser Service & Engineering Co., 310 Twelfth street, Hoboken, N. J., recently has developed and placed on the market a bevel gear which affords great flexibility where universal joints are required. The device operates freely through an angle of 135 degrees and it is claimed that the efficiency of transmission is about 95 per cent at all angles. Among the claims advanced

(*Concluded on page* 94)

Easy
TO HANDLE!
Hard
TO ABUSE!

More work with less effort is accomplished with Truscon Copper-Bearing Steel Foundry Flasks. Excess weight is eliminated because it is unnecessary. Rugged strength of Truscon Flasks is obtained by design and construction rather than dead, useless weight. • Make your next order for foundry flasks read "TRUSCON." Your molders will like them. Write for catalog which illustrates and explains Truscon Steel Flasks for light, medium and heavy castings handled by one man, two men or by power equipment.

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SUBSIDIARY: Republic Steel Corporation

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ALLOY STEEL FOUNDRY FLASKS

The Ideal Material for Sand Blasting

. . . . . it cleans fast
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FLINT SHOT gives a class of finish impossible to duplicate with any other forms of abrasives. Its round, pearlike granules are as hard and sharp as flint. Does not split up, only wears down and can be used over and over again many times. It flows freely, requiring less air power. FLINT SHOT LASTS. Relatively dustless.

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Three plants to meet your needs with dispatch.

Washed, Dried and Screened Special Sands for
Steel Moulding
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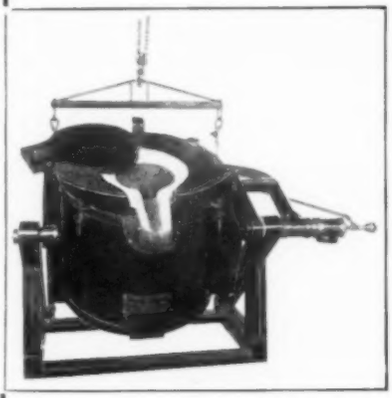
OTTAWA SILICA COMPANY

Ottawa, Illinois

ANOTHER *Fisher* DEVELOPMENT
S.P.C. TILTING MELTING FURNACE



Tilted with Either Electric or Hand Hoist

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No Impingement of Waste Gases

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Constant Pouring Arc

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Built Low for Ease in Charging

The Fisher S.P.C. is recommended for melting yellow brass and for pouring into ingot molds or transfer ladles.

Metal losses are reduced to 5% or less when charging borings—1% on solid scrap and ingot metal.

Tilts at the nose—producing a constant pouring arc. Oil or gas fired.

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"Builders of Melting Furnaces for 32 Years."

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"Hire" our #1212 Ceylon Plumbago for your quality castings an' I'll bet you it will still be on the job for years to come . . . an' don't overlook our new #7-11 medium priced Plumbago for your all around work. It sure is "slick". I would like to send you free working samples of both. Write for them today.
Bill Gagger

We Manufacture

Seacoals, 10 different grinds.

Core Compounds, Plumbagos, Blackings, Core Washes - - in grades for every purpose.

Parting Compounds: Tripoli, Non-Silica, Liquid.

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"Volclay" Wyoming Bentonite
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1857 Carter Rd., Cleveland, Ohio

RADIANT FACINGS
Since 1879

(*Concluded from page* 92)

are that the gears mesh accurately at any angle between 45 and 180 degrees; affords great flexibility where universal joints are required; assembly is quick and simple; cast steel guards and housings and solid steel gears; can be supplied in any metal to suit customer's requirements; usable in any plant for remote control.

Hardness Tester

Steel City Testing Laboratory, 8843 Livernois avenue, Detroit, has developed a portable type hardness testing hammer designed primarily for testing material too large or too heavy for transporting to and testing with brinell machines of standard construction. With the hammer pressed against the object to be tested, the hammer strikes automatically and the diameter of the impression made by the blow is related to the degree of hardness found by the brinell machine. Adjustment of striking power is secured by turning the cover on the hammer. With the hammer the company is in position to supply test piece with standard impressions, hardness chart and brinell microscope.

CLEVELAND TRAMRAIL

OVER HEAD HANDLING EQUIPMENT

• Cleveland Tramrail hand operated Sand Handling Equipment fitted to the individual requirement of each job, still retains the basic materials handling principles which have made Tramrail the most efficient equipment for overhead moving of materials or product through the foundry processes.

ALSO BUILDERS OF CLEVELAND CRANES ALL WELDED

CLEVELAND TRAMRAIL

DIVISION OF

THE CLEVELAND CRANE & ENGINEERING CO.

1155 Depot St.

WICKLIFFE, OHIO.

Or Consult Your Phone Directory under Cleveland Tramrail

Adventures of Bill

(*Concluded from page* 58)

general delivery address at Mobile, he never had the courtesy of a reply. Since that time he had bestowed his patronage on a competing line except in an emergency and then he had made it a point to hop the cars by daylight.

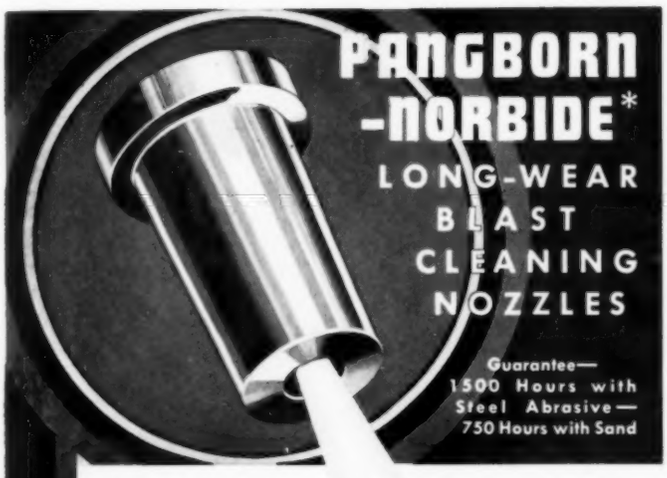
"For over an hour he regaled me with references to people, events and places he had met, experienced and seen at one time or another in every section of the country. I wish I could remember half of them. 'Twould make quite a story.

"Passing leisurely through a small California town he saw a cupola stack sticking up through the roof of a building. He had 4 or 5 dollars at the time and therefore was not looking for employment. Natural curiosity led him to peep in at the door. A hand reached out grabbed him, hauled him inside and before he could voice a protest he had a shovel in his hand helping another lad to fill a big flask with sand. The old man needed an extra hand and with the unerring instinct of the true craftsman had spotted him for a molder the instant he had set eyes on him.

"He had another peculiar experience while working for my old friend Len Schad in Walla Walla. The cupola fan was driven by a water wheel in a flume connected with a creek. One day in the middle of the heat the fan slowed down and finally stopped. Creates a bit of a disturbance in any foundry when that happens, what with the stoppage of operations and the danger of the tap hole freezing. The gaffer calls down blistering maledictions on the fan makers even to the third and fourth generation. The cupola man asks how in the name of all the holy angels and saints he is going to melt iron with a fan that he always said was hardly strong enough to blow the foam from a glass of beer. Men on feeding jobs holler for more iron and the whole place is in an uproar.

"No excitement of any kind on this occasion. Two men with long poles ran up to where the water from the creek entered the flume through a strainer. The men poked around with the poles and dislodged a mess of eels that had floated down with the current and came to rest against the strainer plate. Once more the water rushed through the flume. The wheel commenced to turn. The fan picked up speed and began to sing merrily and the remainder of the heat was run off in the usual manner. Now what do you think of that?"

"I should like to have Len's confirmation on that," I said. "Sounds to me like a fish story."



PANGBORN -NORBIDE*

LONG-WEAR BLAST CLEANING NOZZLES

Guarantee— 1500 Hours with Steel Abrasive— 750 Hours with Sand

The lining material of these nozzles is Norton Boron-Carbide, the hardest material ever made by man for commercial use.

Decrease air consumption 10% to 20% over iron nozzles. They give more service per dollar cost than any nozzle now available...750 hours with sand, 1500 hours with steel grit and shot.

*Trade-Mark of Norton Co. for Boron-Carbide

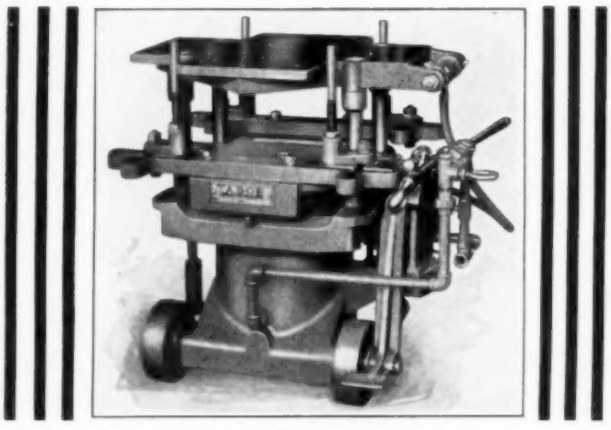
PANGBORN CORPORATION

The World's Largest Manufacturer of Blast Cleaning and Dust Collecting Equipment

HAGERSTOWN . . . . MARYLAND

One of the Complete Line of

TABOR TRADE 1884 MARK **Profit Producers**

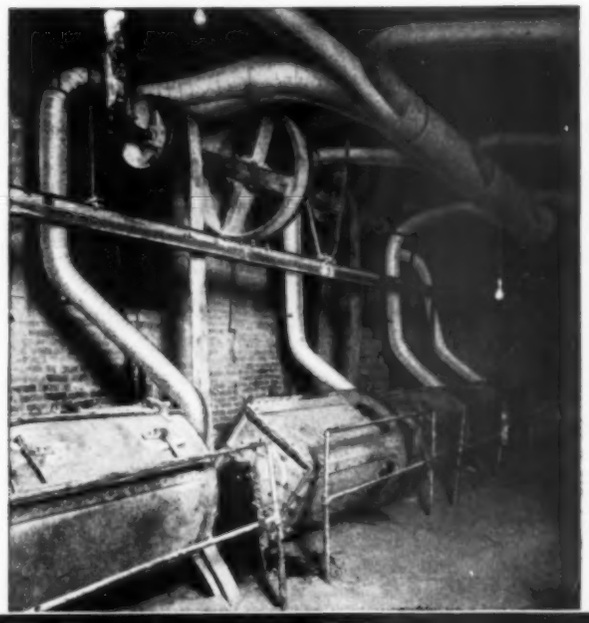


JAR FLASK LIFT MACHINE WITH ADJUSTABLE PINS

Lifting pins provide for a wide range of flask sizes. A machine for fast production —particularly adaptable to cope molds.

The **TABOR** TRADE 1884 MARK **MANUFACTURING CO.**
6225 Tacony Street
PHILADELPHIA, PA.

Foundry Molding Machines and Equipment



KIRK & BLUM
Dust Collecting Systems

Insure a Healthier, Cleaner Plant . . .

One of the country's foremost manufacturers of automotive parts writes: "Forged automotive parts are put through tumblers to remove scale. Our K & B System carries off this scale, which, if allowed to escape into the air, would make working conditions very unpleasant, besides causing damage to motors and machinery." Let our engineers show you how to remove unhealthful, destructive dust and fumes from your plant, efficiently and economically—just as they have for other leading foundries and metal working plants. Complete details of this service and book of interesting, valuable data mailed upon request. Write — no obligation.

THE KIRK & BLUM MFG. CO., • **2808 Spring Grove Ave., Cincinnati, O.**

Designers and Builders of Dust Collecting, Fume Removal, Ventilating Systems — Industrial Ovens — Pickling and Plating Equipment, Etc.

Chicago Representative: C. P. Guion, 1661 North Milwaukee
Pittsburgh: Bushnell Machinery Co., 311 Ross Street
Louisville: Liberty Eng. & Mfg. Co., Inc., 1450 S. 15th St.

FOUNDRY ACTIVITIES

BIRDSBORO STEEL FOUNDRY & MACHINE CO., Birdsboro, Pa., has awarded contract to C. T. Painter, Reading, for alterations and improvements in its Reading, Pa., foundry at an estimated cost of $40,000.

* * *

Toledo Scale Co., 3216 Monroe street, Toledo, O., has purchased the Defiance Machine Works, Perry street, Defiance, O., and will operate the plant as the Defiance division of Toledo Precision Devices, Inc. Officers of Toledo Precision Devices, Inc. are: H. M. Bennett, president; G. R. Bennett, vice president; W. A. Fink, secretary-treasurer. H. E. McDowell has been made superintendent of the foundry, J. L. Glaser, assistant treasurer and assistant secretary at Defiance. Key men of the Defiance Machine Works will continue including plant superintendent Rude Kenning and plant engineer R. G. Hummer.

* * *

John C. Kupferle Foundry Co. is building a one-story 46 x 57-foot addition to its foundry.

* * *

A. W. Cadman Mfg. Co., 2816 Smallman street, Pittsburgh, has been licensed by the Westinghouse Electric & Mfg. Co., to produce cupaloy, a new copper alloy having desirable thermal and electrical properties of copper.

* * *

Meehanite Metal Corp., Pittsburgh, recently licensed the following companies to produce Meehanite metal: Fleming Foundry Co., Springfield, Mass.; Perry Engineering Co., Kalgoorlie Foundry Co., Goninan Co., all of Australia.

* * *

Milwaukee Steel Foundry Co., Milwaukee, has extended group insurance benefits to its employes under contract which for sometime has covered the personnel of two asso-

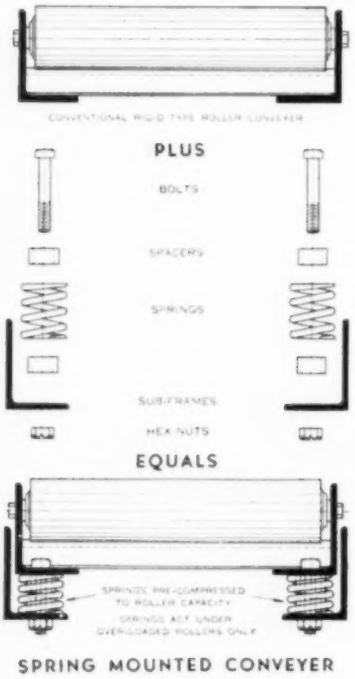
(Concluded on page 98)

MATHEWS SPRING MOUNTED CONVEYERS

WHY. . . . . to lower maintenance costs.

WHERE . . . where the service is abusive to rollers, bearings, and axles.

WHEN. . . . for new installations or to replace old equipment.

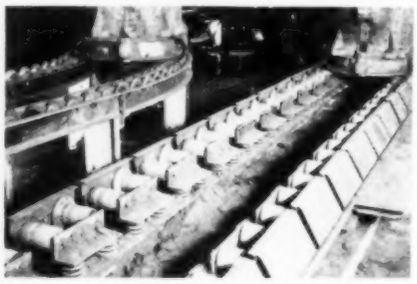


SPRING MOUNTED CONVEYER

Mathews Spring Mounted Conveyers are Protected by United States Patents No. 1,518,836; 2,077,188; 2,077,189; 2,077,190; 2,107,822 and Other Patents Pending.

CAUSE AND EFFECT

THE principle is simple; the roller axles are rigidly locked in the frame as in the conventional "rigid type" construction, but the conveyer frame which retains the rollers is carried on pre-compressed coil springs, the springs held in compression equal to the rated safe load of each roller. Under impact conditions or excessive loads the springs absorb the overload.



In pioneering this development Mathews Engineers have made available to industry nine sizes which cope with the majority of applications.

TYPE 33, Rollers 1⅝", 1.9", 2¼", 2½" diameters, 150 lbs. capacity per roller. **TYPE 53,** Rollers 2⅜", 3½" diameters, 600 lbs. capacity per roller. **TYPE 58,** Rollers 3½" diameter, 2000 lbs. capacity per roller. **TYPE 63,** Rollers 4¼" diameter, 4000 lbs. capacity per roller. **TYPE 110,** Rollers 5" diameter, 8000 lbs. capacity per roller.

Ask for Data Sheet 24-A & B. It contains complete engineering data. The book "Equipping Industry for Continuous Production" illustrates installations. Both items sent upon request.

MATHEWS CONVEYER COMPANY
104 TENTH STREET, ELLWOOD CITY, PENNA.

CONTINUOUS FLOW PRINCIPLE OF HANDLING MATERIALS

RAW MATERIAL PRICES
Jan. 24, 1939

Iron		
No. 2 foundry, Valley		$21.00
No. 2 Southern Birmingham		17.00
No. 2 foundry, Chicago		21.00
No. 2 foundry, Buffalo		21.00
Basic, Buffalo		20.00
Basic, Valley		20.50
Malleable, Chicago		21.00
Malleable, Buffalo		21.50
Charcoal iron, furnace		25.00
Coke		
Connellsville beehive premium	$5.75 to	$6.25
Wise county beehive coke	5.50 to	6.50
Detroit by-product delivered		10.25
Scrap		
Heavy melting steel, Valley, No. 2	$14.00 to	$14.50
Heavy melting steel, Pittsburgh, No. 2	14.50 to	15.00
Heavy melting steel, Chicago, Auto No. 2	11.00 to	11.50
Stove plate, Buffalo	13.00 to	13.50
Stove plate, Chicago	8.50 to	9.00
No. 1 cast, mchy. New York	12.00 to	12.50
No. 1 cast, mchy., Chicago	12.00 to	12.50
No. 1 cast, Pittsburgh	15.25 to	15.75
No. 1 cast, Philadelphia	16.50 to	17.00
No. 1 cast, Birmingham	14.00 to	14.50
Car wheels, iron, Pittsburgh	15.00 to	15.50
Car wheels, iron, Chicago	13.50 to	14.00
Railroad malleable, Chicago	15.00 to	15.50
Malleable, Buffalo	13.50 to	14.00
Nonferrous Metals	**Cents per pound**	
Castings copper, refinery		10.77½
Straits tin		46.13
Aluminum, 99 per cent		20.00
Aluminum, No. 12 (Secondary, standard)	12.75 to	13.25
Lead, New York		4.85
Antimony, New York		11.75
Nickel, electro		35.00
Zinc, East St. Louis, Ill.		4.50

UNIFORMITY
UNIFORMITY
UNIFORMITY
UNUSUAL

YOU CAN DEPEND ON

REVIVO BOND

FOR UNIFORM QUALITY FOR
BONDING FOUNDRY SANDS

• • *SOLD WITH SERVICE* • •

EASTERN CLAY PRODUCTS, Inc.
EIFORT OHIO

FOR GRAY IRON FOUNDRIES

Gray Cast Iron

By John W. Bolton

A COMPLETE DISCUSSION IN ONE VOLUME ON THE SUBJECT OF GRAY CAST IRON

■ Presents the basic metallurgical principles involved in the manufacture of gray iron to modern engineering specifications.

Its 22 chapters discuss such phases as melting processes, casting defects, design, effects of regular and alloying elements, superheating, heat treatment, physical properties, machinability and wear, effect of temperature on mechanical properties, corrosion, and specifications.

383 Pages, 262 Illustrations, Diagrams, Charts & Tables

PRICE, POSTPAID $5.00

THE PENTON PUBLISHING CO.
Book Department
Penton Building Cleveland, Ohio
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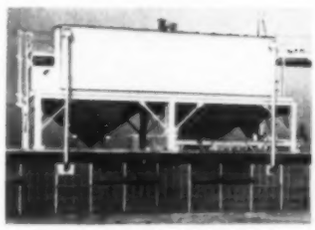
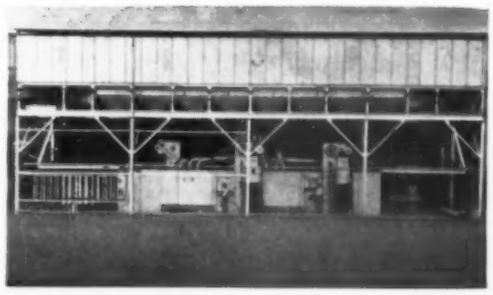
PARSONS DUST CONTROL



SUPER-SERVICE at low cost is "clear" when you use a Parsons Dust Collecting System.

Engineers and foundrymen are quick to notice the "calibre" of equipment.

Whether conditions call for wet or dry systems, they say Parsons is "tops".



PARSONS ENGINEERING CORPORATION
CLEVELAND, OHIO

(*Concluded from page* 96)

ciated organizations, the Liberty Foundry Inc., Wauwatosa, Wis. and the Spring City Foundry Co., Waukesha, Wis. The plan is underwritten by the Metropolitan Life Insurance Co. on a co-operative basis.

Index of foundry equipment orders for December, according to a report of the Foundry Equipment Manufacturers' association, Cleveland, was 141.8 as compared with 89.7 in November and 111.2 in December, 1937. Index of shipments was 102.8 as compared with 94.5 in November and 159.8 in December, 1937.

NEW TRADE PUBLICATIONS

ALLOYING STEELS — International Nickel Co. Inc., 67 Wall street, New York, recently has made available a revised copy of its data sheet section III, No. 1 on "Properties and Uses of Some Cast Nickel Alloy Steels." The new data sheet replaces the original data sheet in the firm's book, "Nickel Alloy Steels."

UNIT HEATER—Surface Combustion Corp., Toledo, O., has issued a folder setting forth specifications and description of a gas fired unit heater designed for use in industrial plants. The unit operates on natural, artificial, butane or propane gas and it is claimed delivers 10,000 cubic feet of air per minute at a temperature rise of 125 degrees Fahr.

CORE OVENS — C. O. Bartlett & Snow Co., 6200 Harvard avenue, Cleveland, has issued bulletin No. 86 describing its automatic vertical core oven. A blueprint layout illustrates the oven's operation. Other equipment manufactured by the company also is described briefly.

DUST CATCHER—Sturtevant Mill Co., Park and Clayton streets, Dorchester, Mass., has issued a bulletin describing equipment for dust and fume suppression in manufacturing processes. The device, manufactured in various sizes and combinations, separates the dust from the air by a combination of centrifugal force, wet impingement and washing.

Copies of any of the literature listed here may be obtained by writing directly to the companies involved, or by addressing THE FOUNDRY, in care of Readers' Service Department, 1213 West Third Street, Cleveland

LATHES — A book entitled "Modern Industrial Shops", issued by the South Bend Lathe Works, 425 East Madison street, South Bend, Ind., contains pictures showing this firm's lathes in operation in the shops of numerous nationally known organizations.

SPECTROGRAPHY—Adam Hilder Ltd., 98 St. Pancras Way, Camden road, London, England, has published two new bulletins relating to spectrography and spectrophotometry.

AIR HELMETS — Pangborn Corp., Hagerstown, Md., has issued a 3-page bulletin describing a new blast helmet which is light weight, easily detached from hose line and large enough so that the airblast operator is able to wear glasses without inconvenience. The bulletin also gives information on steel shot and grit, Norbide nozzles, air blast hose and abrasive resistant rubber lining that is easy to cut to shape and easy to apply to any metal surface.

SCALES — Bulletin No. 1253, issued by the Atlas Car & Mfg. Co., 1120 Ivanhoe road, Cleveland, describes the firms indicating dial scales of all steel construction, and scale cars. Also featured in this bulletin is the Atlas method of magnet loading of buckets by yard crane. Illustrations of installations supplement the text.

REMOTE CONTROL — Foxboro Co., Foxboro, Mass., has published a 7-page booklet describing a new pneumatic

(*Concluded on page* 100)

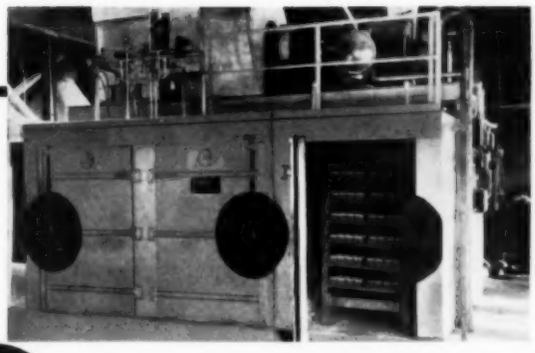
CORRECT • CONSTANT SURFACE SPEED!

√ Check √
Write for Information on
The Cincinnati

Keep up the work tempo . . . get maximum production in your Grinding Department with THE CINCINNATI FULCUT GRINDER. Simply by turning a conveniently located hand wheel, any speed changes can be made while running. No time-killing pulley or gear shifts; no belt changes. FULCUT maintains the cutting wheel at full efficiency ALWAYS. Just one of 10 Superior Features. Write for folder.

- Electric Drills
- Screw Drivers
- Nut Setters
- Tappers
- Aerial Grinders
- Tool Post Grinders
- Bench and Pedestal Buffers
- Bench and Pedestal Grinders
- Abrasive Cut-Off Machines

THE CINCINNATI ELECTRICAL TOOL CO.
Division of The R. K. LeBlond Machine Tool Co.
2678-1 Madison Rd. . . . Cincinnati, Ohio, U. S. A.



COLEMAN
CORE AND MOLD OVENS

This battery of three Coleman Transrack Core Ovens with gas-fired Coleman Recirculating Heating System has resulted in remarkable economies for the Jamestown Malleable Iron Corp., Jamestown, New York.

Coleman Ovens quickly pay for themselves wherever they are installed. Coleman Engineers will gladly recommend the best type of ovens to handle your work dependably at the lowest possible cost for fuel and labor.

Why waste money with obsolete baking equipment?

WRITE FOR COMPLETE CATALOGS

The FOUNDRY EQUIPMENT CO.
• COLEMAN AND SWARTWOUT OVENS •
CLEVELAND, OHIO

GATES AND RISERS FOR CASTINGS

By Pat Dwyer

A COMPLETE encyclopedia, a ready reference and a practical guide to sound foundry practice. In addition to a description of every conceivable type of gate and riser, the text covers the application and function of gates and risers to all sizes and types of castings. Illustrations on almost every page enable the reader to grasp the salient points with a minimum of study.

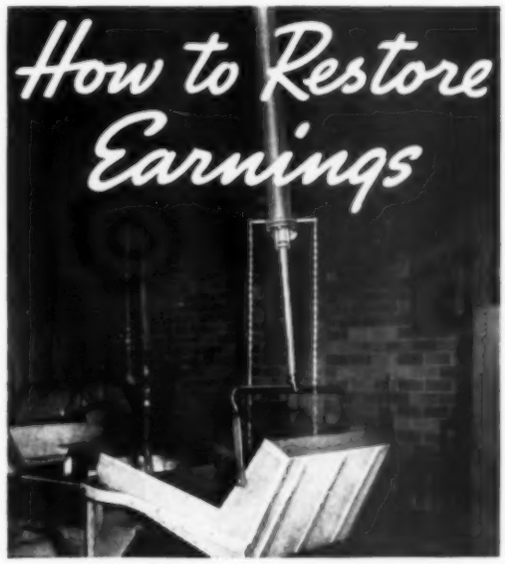
363 pages
244 illustrations

Indexed for ready reference

Price, $3.00 Postpaid

The Penton Publishing Co.
Book Dept.
1213 W. 3rd St. Cleveland, Ohio

317-F



WITH CURTIS AIR POWER HOISTS

Original cost, maintenance costs, depreciation are all lower with sturdy, simple Curtis Air Hoists than with other types of power hoists. And they provide smooth, dependable, accurate material handling which speeds up operations. All this adds up into profits.

Curtis Air Power Hoists show unusual stamina on the *tough* jobs. Ruggedly constructed with only one moving part, they operate for many years with a minimum of attention. They are not subject to injury from overloads or bad atmospheric conditions.

Examine your plant for applications of Curtis Air Power Hoists—it's an important opportunity to add to profits by cutting costs and increasing production.

For suggestions and useful data on Air Power, send the coupon below for our booklet, "How Air is Being Used in Your Industry."

CURTIS Compressors • Air & Hydraulic Cylinders Air Hoists • I-Beam Cranes & Trolleys

CURTIS PNEUMATIC MACHINERY COMPANY
1922 Kienlen Avenue, St. Louis, Mo.
Gentlemen: Please send me your booklet, "How Air is Being Used in Your Industry," and further information on Curtis Air Power Hoists.

Name_____
Firm_____
Street_____ State_____
City_____

(*Concluded from page 98*)

transmission system for remote measurement and control of flow, temperature, level and pressure. Typical installation illustrations are supplemented by explanatory captions for the four types of transmission. A cutaway photograph showing the interior construction of the pneumatic transmitter is included, as well as schematic drawing and complete details of operation of the entire transmitter system.

ROLLER CHAINS — Chain Belt Co., 1600 West Bruce street, Milwaukee, has issued catalog No. 333 of 13 pages giving tables and data on its roller chains and sprockets. Information is included on roller chain drives, chain lengths, horsepower capacities, flexible couplings, and cut tooth sprockets, both standard and to order. The catalog is generously illustrated with photographs of installations and the individual products.

DIESEL ENGINE — Operating costs and specifications of the 25-horsepower Caterpillar diesel D2 tractor are given in a new booklet published by Caterpillar Tractor Co., Peoria, Ill. Features of the tractor's engine, transmission and track construction are shown by photographs and are explained in the corresponding text.

UNIT HEATERS — Fedders Mfg. Co., 57 Tonawanda street, Buffalo, has published a 12-page bulletin describing its series 4 unit heaters. Included are illustrations of the heaters' sturdy construction and wide adaptability, also tables giving the heating capacities of the various models.

STEEL — Allegheny Ludlum Steel Corp., Brackenridge, Pa., has published a brochure which traces briefly the growth of the parent companies and describes present facilities, assets, etc.

LIGHTING — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has issued a bulletin describing the Westinghouse standard silvered bowl diffusers. These reflectors are designed for use with 300 or 500 watt silvered bowl lamps for general lighting of low bay areas.

CEMENT — Atlas Lumnite Cement Co., Chrysler building, New York, has issued a folder describing the corrosion and heat resistant properties of its Lumnite cement. Described in the folder are its properties as a protective lining for steel stacks, mortar for brick chimneys and its adaptability for chimney maintenance.

WELDING — An 8-page booklet, B 2150-A, published by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., lists common troubles met by welders and discusses the cause and cure for each.

SIFTERS — Sprout, Waldron & Co. Inc., Muncy, Pa., has issued bulletin No. B-2 describing its roto-sifter designed for a variety of sifter operations. Included in the booklet are sketches showing the mechanical and structural features of the roto sifter, also a list of its applications.

CONVEYORS — Cleveland Crane & Engineering Co., Wickliffe, O., has issued a folder entitled, "Cleveland Tramrail Will Bring Up and Take Away". The folder is profusely illustrated with pictures of installations showing the conveyance of raw material, semifinished pieces, subassemblies.

CRANES — Three models of shovels, cranes and draglines produced by American Hoist & Derrick Co., St. Paul, are described in a recent bulletin. The models have capacities of 1½, 1¾ and 2 yards. Illustrations show details of construction and text matter explains the drum shaft assembly and heavy duty shovel boom.

CASTINGS—A folder describing Foseco products of Foundry Services, Inc., 107 East Forty-first street, New York, has been issued. Featured are coveral, cuprit, aluminum degaser, cuprex and albral for overcoming porosity, blowholes, inclusions and low physical properties for aluminum, copper and nickel alloys, aluminum bronze, manganese bronze, silicon bronze, aluminum brasses, etc., castings. Other products are listed and described.

FUSES — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has published a booklet describing dry boric-acid power fuses used for the protection of high-power plants, and for all high-voltage power use, indoor and outdoor.

CRANES — American Hoist & Derrick Co., St. Paul, has issued a catalog describing its 40 and 50-ton locomotive cranes giving data on lifting capacities, information on constructions and photographs of installations. Another catalog illustrates and describes a line of gasoline, diesel and electric general purpose hoists.

REFLECTORS — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has issued a 4-page booklet describing new locklite reflectors and hoods designed for industrial lighting. Tables give information concerning styles, wattage, size, weight and foot candle illumination for various mounting heights, spacings and different lamp wattages.

REFRACTORY—Ironton Firebrick Co., Ironton, O., has issued a folder describing the qualities of its firebrick for use in furnaces operating under severe conditions such as boiler furnaces, forging and welding furnaces, heat treating furnaces, open hearth furnaces, etc.

RED STREAK FLANGES

The New, Patented,* Built-In Flanges

A sensational new development in high-speed resinoid wheels 24" and 30" in diameter by 12" hole size! Consist of two circular steel flanges or plates permanently embedded and bonded into the sides of the wheel adjacent to the center hole and lining a portion of it. Foundrymen, if you have not seen this new development you owe it to yourself to investigate! Write for Bulletin ESA-56 for complete details.

*U. S. Patent 2,121,656

ABRASIVE COMPANY

ABRASIVE TRADE MARK REGISTERED

Division of Simonds Saw and Steel Co.
Tacony and Fraley Streets, Philadelphia, Pa.
Chicago Branch: 1624 South Western Avenue
Distributors in All Industrial Centers